Land use planning, coastal inundation and coastal erosion in Tasmania

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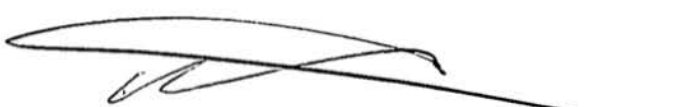
Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any tertiary institution, and to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference is made in the text.

Signed



Luke Roberts

This thesis is an uncorrected text as submitted for examination.

Abstract

This study seeks further understanding of how to use land use planning to improve the current Tasmanian practice in mitigating the impacts from coastal hazards and adapt sea level rise resulting from climate change. Coastal hazards include coastal inundation and coastal erosion, which under current climate change scenarios, will increasingly have impact on coastal communities through emergency events including storms or long-term coastal change though coastal retreat. Over long periods of time land use (and risk-based) planning allows people to alter the impact of change, from currently vulnerable settlement patterns to more resilient ones. The study focused on current practice in five Tasmanian local governments identified as those most vulnerable to coastal hazards: Break O'Day, Central Coast, Clarence, Kingborough and Waratah-Wynyard. In particular, and drawing on empirical data from those local governments, the research focuses on the interrelationships among planning, risk and emergency management, making a series of observations about current governance. Four themes emerged from reviewing current planning schemes[1], examining available spatial information and interviewing planning staff in each of the five councils: **capacity**, **integration**, **communication**, and **tools**. More specifically, analysis of the themes provided an opportunity to examine land use planning in response to coastal hazards, including: council **capacity** (in skills, resources and finances); **integration** of schemes and planning controls to ensure that hazards are treated in a common way; use of **communication** to ensure communities are consulted and

[1] Under the Land Use Planning and Approvals Act 1993, a planning scheme regulates the land use and development in a local government area.

participate in planning and emergency management processes; and the development of common **tools** for schemes, risk assessment methods and data sets. This study provides insights in to the current failings in planning for coastal hazards, pointing to principles, which can be used in processes of change management from ad hoc to integrated systems of planning with the aim of developing community resilience to coastal inundation and erosion.

Acknowledgements

Thank you to the council officers from Break O'Day, Central Coast, Clarence, Kingborough and Waratah-Wynyard Councils who kindly gave up their time.

I'm grateful to Elaine Stratford and Richard Mount for their patience, advice and reviews.

I sincerely appreciate the involvement of Mat Healy, the Department of Premier and Cabinet, Tasmanian Planning Commission (TPC), Local Government Association Tasmania (LGAT), and the Department of Climate Change and Energy Efficiency.

Finally, the greatest thanks go to my partner Linda and our bump.

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Glossary

ACE-CRC	Antarctic Climate and Ecosystems Cooperative Research Centre
AEP	Annual exceedance interval
ARI	Annual recurrence interval
BODC	Break O'Day Council
DA	Development Application
DPAC	Department of Premier and Cabinet including the Climate Change Office
DPEM	Department of Police and Emergency Management
DPIPWE	Department of Primary Industries, Parks, Water and Environment
GIS	Geographical Information Systems/ Science
LGAT	Local Government Association of Tasmania
LiDAR	Light Inferred Detection And Ranging
LUPAA	Land Use Planning Approval Act 1993
RMPS	Resource Management and Planning System
SEMC	State Emergency Management Committee
SES	State Emergency Service
TPC	Tasmanian Planning Commission

1. Introduction

Erosion and inundation are naturally occurring processes in coastal and near coastal zones, causing significant community, economic and infrastructure impacts as they interact with the built environment.

In this study, I have addressed a 'wicked problem' (Rittel and Webber 1973), asking how are decisions regarding dynamic problems made in complex dynamic systems? My **aim was to understand** how to improve current methods of land use planning to mitigate the severity of impacts resulting from coastal hazards and to aid adaptation to climate change enhancements of coastal hazards, including through emergency management. To achieve such ends, I investigated current land use planning practices among five local government councils in Tasmania (Figure 1; see also section 3.1.1). I completed interviews and a comparative analysis of planning scheme provisions and spatial data sets to understand current and possible future strategies for emergency management and land use planning. Note here that the Tasmanian system for land use planning is made up of a suite of laws collectively known as the Resource Management and Planning System (RMPS). Within the RMPS local governments sit at the junction of the policy and practice for natural hazards management in their role as the regulators of land use and development.

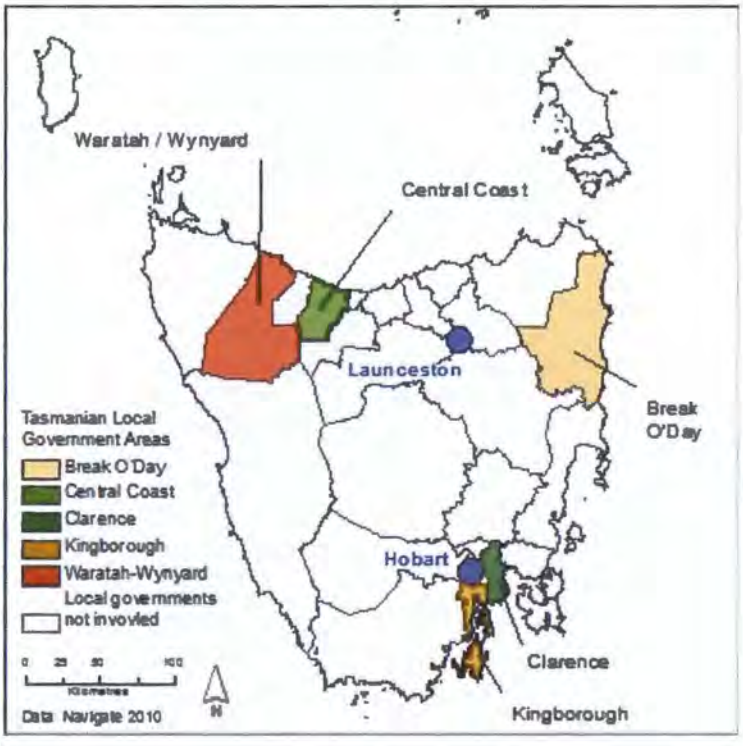

Figure 1 Map of Tasmania showing five participating local government areas

In particular I thought about the interactions between and among **coastal hazards, land use planning** and **governance** (Figure 2). In thinking about **coastal hazards** I wanted to outline the science behind hazards, including what those hazards are, the factors that contribute to them, the areas they affect, and the evidence or modelling used to make decisions on. Considering coastal hazards meant thinking about the data sets used to make decisions about requirements for spatial, attribute and temporal accuracy. **Land use planning** reviews the tools used to mitigate and adapt to the impacts of coastal hazards, considers the strengths and weakness of using land use planning for coastal hazards; here it is considered a subset of governance – a mix of public, private and non-government decision-making. **Governance** pertains to how the Tasmanian Resource Management and Planning

System (RMPS) works in the context of coastal hazards. Each of these elements is discussed in detail in the literature review, revisited in the analysis of empirical data, and then brought together in the final discussion.

Figure 2. Research junctures

The juncture represents the wicked problem – how are decisions regarding dynamic problems made in complex dynamic systems?

In this work I accept as a baseline for discussion the Commonwealth Department of Climate Change Scenario 3 High End Level of 1.1 m, used as part of its modelling of coastal vulnerability (DCC 2009). I do not review responses by councils to climate change nor examine the role of elected officials as decision makers in planning authorities, but acknowledge that all planning decisions in council are either made directly by or under delegation from those planning authorities (LUPAA 1993; LGAT 1993).

In order to achieve the aforementioned aim by exploring current and possible practices and developing a synthesis of common themes in land use planning and coastal hazards, I completed semi-structured interviews with selected planning staff, reviewed State planning literature including planning schemes, examined spatial data sets and read scholarly and policy literature on coastal hazards, policy and planning.

Ethics approval was required for this project given the involvement of stakeholders in State and local governments. The University of Tasmania "scope checker" identified the need for a Social Science HREC Minimal Risk Application. The approval (H11231) and the documentation sent out to each council are at Appendix 1 and 2 respectively.

1.1 Context for the research

As a tool of governance, land use planning has the potential to mitigate the impacts of coastal hazards and exacerbate them by increasing the exposure of settlements to natural hazards, resulting from the inherent failures and unintended consequences present in all planning systems (Godschalk *et al.* 1998; Malpas and Wickham 1997; Randolph 2004).

Planning and land use planning are complex interrelated systems, continually shifting to reflect the changing human and physical environment, (PIA 2010; Randolph 2004; Thompson 2007). For the purpose of this research, the term 'planning' is the same as that supplied by the Planning Institute of Australia (PIA 2010): "Planning is the process of making decisions to guide future actions". In

this context, planning for coastal hazards requires that planners understand what to do where on coasts to reduce, mitigate or adapt to coastal hazards and know how to use the various strategies and tactics of governance to achieve such ends. Hence the focus on wicked problems, since such demands are complex.

Broadly, coastal hazards are a subset of natural hazards. Natural hazards include flooding and other weather-related damages, geological hazards such as earthquakes and landslides, forest and grass fires, and natural pests and disease-transmitting organisms (Randolph 2004). As individual events, they are naturally occurring processes reflecting the dynamic nature of the environment, only becoming a hazard to the human population at locations in which our existence interacts with the natural process (Godschalk *et al.* 1998; Pilkey and Young 2009; Randolph 2004).

In coastal areas (defined by the Tasmanian State Coastal Policy as land within 1 kilometre of the coastline (TPC 1996)) coastal hazards include tsunami, storm surge, sea level rise, coastal flooding and inundation. For the purpose of this thesis, coastal hazard will include coastal erosion and coastal inundation, unless identified separately. Coastal hazards currently have impact upon the State's coastal areas and, under current climate change predictions, the risks they present will increase as climate change-induced sea level rise becomes a more significant component in the coastal environment. Thus, coastal communities will also become increasingly vulnerable (Beatley 2009; Department of Climate Change 2009; Nicholls *et al.* 2007; Pilkey & Young 2009; Sharples 2006; Wilbanks *et al.* 2007).

Nationally 80 per cent of the Australian population lives within the coastal zone (Henesey *et al.* 2007). Forty-five per cent of Tasmanians live within 1 kilometre of the coastline (Chen and McAneney 2006) and 75 per cent live in a council area that is bordered by the coast (Department of Climate Change 2009). These statistics highlight the point that a significant proportion of the Australian and Tasmanian populations could potentially be affected by social, physical or financial consequences of coastal hazards.

Coastal erosion affects areas with soft shorelines including sandy, muddy, clayey or gravelly shores where current coastlines are worn away through wave and wind action (Sharples 2006). One Australian Department of Climate Change (2009) report estimated that 6100 dwellings in Tasmania are within 110 metres of a soft shoreline, with Clarence, West Tamar and Kingborough Councils having the highest proportion of such circumstances.

Coastal inundation affects low-lying coastal areas. It has been estimated that up to 11 600 dwellings in Tasmania may be affected by sea level rise (1.1m) and a one per cent annual recurrence interval (ARI) storm event (Department of Climate Change 2009). The Tasmanian councils identified as having the highest risk include Clarence, Central Coast, Break O'Day and Waratah-Wynyard, shown in Figure 1 (representing approximately 50 per cent of the total population of the island) (Department of Climate Change 2009). Current climate change predictions suggest that erosion and inundation events will increase in frequency and severity over the next 100 years (Sharples 2006); therefore it is likely that coastal towns will be affected more often.

The southern Tasmanian newspaper, *The Mercury*, has reported on community concerns related to coastal hazards. Stories such as "Caught short in a rising battle" (Killick 2010a) and "Suburbs watery fate" (Killick 2010b) report on existing impacts, future development, and governance controls. These concerns are by no means new; at the June 2008 State Parliamentary Joint Standing Committee on Shore Line Erosion, submissions were made regarding the historic impacts for shoreline erosion in the southern Tasmanian localities of Eggs and Bacon Bay (Huon Valley) and Nutgrove Beach (Sandy Bay) over the last 50 years (JSCERD 2008). Given such headlines – and the social, spatial and political issues that stand behind them – this research is timely and, I hope, of use.

1.2 Structure of the thesis

The thesis is presented in five sections. This introduction has given an overview of the research and its context. Chapter 2 reflects on the use of land use planning in emergency management, governance and the RMPS, coastal hazards and risk. Chapter 3 outlines the methods used to undertake the empirical component of the research, and describes how interviews with planning staff in five councils were conducted. Chapter 4 provides an overview of the results, analysis of the interviews and discussions along thematic lines, with key quotes and relevant literature, and compares relevant planning scheme provisions, key policy documents, and spatial data sets identified in interviews. Chapter 5 presents a discussion and conclusions, and advances a number of issues for further considerations.

2. Literature review

This literature review provides an overview of issues informing various understandings of coastal hazards (including the enhancement of these hazards by climate change), land use planning and governance that have, in turn, affected later analysis of empirical findings.

2.1 Coastal Hazards

Coastal hazards are a subset of natural hazards which include weather-based hazards of storm surge, extreme tides, cyclones, flooding, extreme heat or cold; geological hazards including erosion, earthquakes and landslides, forest and grass fires, other hazards include natural pests and disease-transmitting organisms (Randolph 2004). Each of these hazards currently occur, can act as individual events or can work together, over various time scales, reflecting the dynamic nature of the natural environment (Godschalk *et al.* 1998; Pilkey and Young 2009; Randolph 2004). In outlining these hazards I will be drawing on the 2009 report by Department of Climate Change and Energy Efficiency into Climate Change Risks to Australia's Coast, a first pass assessment (DCC 2009).

Intimately tied to coastal hazards (and our understanding of them) is climate change-induced sea level rise. Table 1compares sea level rise scenarios used by councils and by lead State and Commonwealth agencies, which report on coastal vulnerability. Three of the seven organisations have not established a position on this matter. Among the remaining four organisations, three different sea level rise scenarios are in use.

Table 1. Climate change sea level rise scenarios adopted by State Government, council or coastal hazard models

Organisation	Report/document	Scenario
Tasmanian Department of Primary Industries and Water	Sharples 2006, p.11	Between 9cm and 88cm by 2100 relative to 2001 levels
Commonwealth Department of Climate Change	DCC 2009, p.28	1.1m by 2100 (AR4 high end)
Central Coast	Stretton 2010, p.6	Identification of a high end scenario for sea level rise of 1.1m by 2100 (AR4)
Clarence	Carley *et al.* 2008 p.10	High scenario 0.9m by 2100 (Table ES.1)
Kingborough	NA	None identified
Waratah-Wynyard	NA	None identified
Break O'Day Council (BODC)	NA	None identified

In general terms, coastal inundation is one kind of hazard event enhanced by the increasing net regional mean sea level rise (Figure 3). As a net extreme event hazard it may be understood as a current recurring risk, including the cumulative factors of storm surge, wind, atmospheric pressure, and coastal and near coastal landforms. Presently this risk has a level of predictability based on historical observations; however little is known about whether and how the risk will change under climate change scenarios, except that the frequency and severity of storm events will likely increase, thereby potentially increasing the coastline's susceptibility to erosion (Beatley 2009; DCC 2009; Randolph 2004; Sharples 2006; Wilbanks *et al.* 2007).

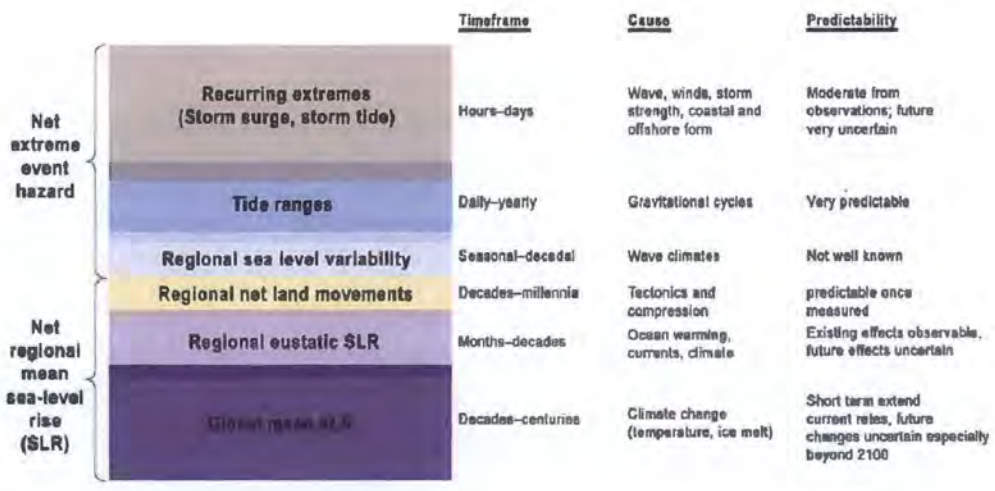

Figure 3. Main contributors to net extreme event hazard and regional mean sea level rise

Source: Jones *et al.* 2009 in DCC 2009, p.23

The other component relating to coastal inundation is the net regional mean sea level rise, comprising regional net land movement, regional eustatic' sea level rise and the global mean sea level rise whose change is directly contributed to climate change (DCC 2009).

It is important that land use planning takes into account these two aspects of coastal inundation: identifying who is vulnerable and documenting when they are likely to be affected (Randolph 2004). Recent mapping exercises in or about Tasmania, including that by Sharples (2006), the Commonwealth Department of Climate Change (DCC 2009) and the Clarence City Council (CCC 2009) have shown the impacts of coastal inundation at a variety of spatial, attribution and temporal scales and have indicated mean sea level rise scenarios, making comparisons between data sets difficult. This comparison will be discussed further in section 4.4.

Coastal erosion is also highly dynamic and variable depending on the relationships among shoreline type, land cover, extreme events, coastal sediment balance and sea level rise (DCC 2009; Sharples 2006). The calculation of coastal erosion-induced shoreline retreat based on the sea level rise is typically performed using the Bruun rule. This rule is used to calculate the rate of retreat for sandy beaches based on a relationship between of sea level rise, shoreline type and a movement of sediments described in Figure 4. As a very simple generalisation the shoreline will retreat 50 to 100 times the expected sea level rise (Sharples 2006).

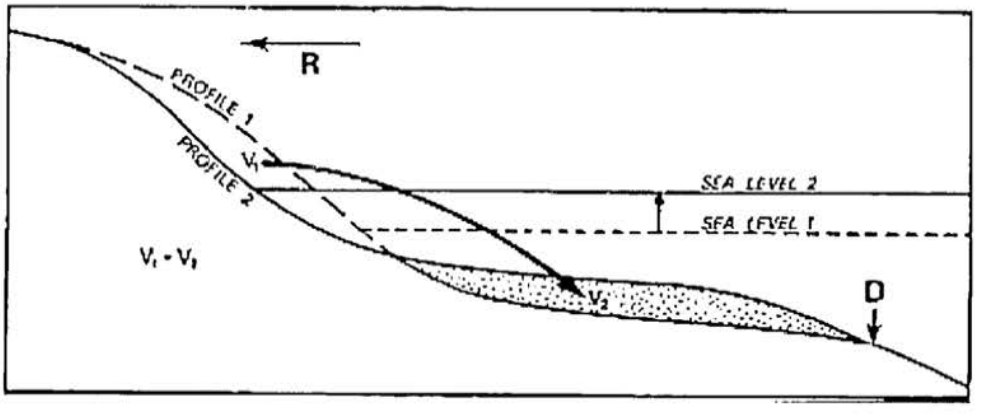

Figure 4: The standard Bruun Rule in its simplest form. From Bird (1993, p.57, Figure 29), whose original caption to this figure reads: "The Bruun Rule states that a sea-level rise will lead to erosion of the beach and removal of a volume of sand (v1) seaward to be deposited (v2) in such a way as to restore the initial transverse profile landward of D_* the outer boundary of near-shore sand deposits. The coastline will retreat (R) until stability is restored after the sea-level rise comes to an end. The coastline thus recedes further than it would if submergence were not accompanied by erosion."

Figure 4. Bruun rule in a simple form

Source: Bird (1993) cited in Sharples 2006, p.28

The Bruun rule, has been challenged by Pilkey and Pilkey-Jarvis (2007) because it simplifies complex and highly dynamic coastal systems into a rule of thumb. Pilkey and Pilkey-Jarvis (2007) advocate the use of other methods based on local

observations to calculate shoreline regression, including extrapolation of current erosion rates, inundation calculations and conceptual models of shoreline retreat.

2.2 Land use planning

The impacts of coastal inundation and coastal erosion require an integrated approach, matching emergency response with strategy and policy (McGuire and Silvia 2010, SES 2009). This requirement reflects back on the wicked problem that is planning for hazards that occur slowly over time or that have impact in a short time frame over the same coastline subject to development and use pressures. Thus any considerations of mitigation include developing preparedness policies; increasing the resilience of coastal communities by writing response plans; identifying responsibilities; undertaking hazard, vulnerability and risk assessments; and ensuring the use of risk-based land use planning (among other tools) to alleviate communities' vulnerability to coastal hazards (Beatley 2009; GA 2009; Henstra 2010; McGuire and Silvia 2010; SES 2010).

The use of land use planning to mitigate the impacts of coastal hazards on coastal communities requires either an immediate emergency responses (for example, those related to storm-related inundation and erosion by the emergency services) or less rapid responses to reduce the impact of emergency events and allow for slower adaptation, such as occurs with coastline adjustments to climate change-related sea level rise (GA 2010; Randolph 2004; SES 2009). Within the context of emergency management, then, land use planning is identified as a method to mitigate or reduce the severity of damage resulting from coastal hazards *and* a means by which to adapt to climate change induced environmental and natural

hazard change (Beatley 2009; DCC 2009; Randolph 2004; SES 2009); this is particularly the case where impacts on infrastructure are *unintended consequences* of historical and current development practices in the coastal zone (Beatley 2009; McGranahan *et al.* 2007; Nicholls *et al.* 2007; Randolph 2004). In general terms, Malpas and Wickham (1997) note that 'the unintended consequence' is one symptom of how governance fails at all times; they suggest it cannot be otherwise because governance is a system responding to a set of conditions and practices within a given capacity, unable to predict all outcomes. Nevertheless, various opportunities and challenges exist in adaptive planning responses to climate change enhanced sea level rise at the local level; a significant goal of such planning, including in terms of emergency management, is to reduce exposure to a hazard as the risk of erosion or inundation increases (Attwater and Witte 2008).

The varying time scales involved in a land use planning response to coastal hazards stretch beyond election cycles or emergency responses, and must take into account not only changing understandings of coastal hazards but investment cycles and the like. Bai (2007) summarised temporal scales for planning actions and the effects of these decision in Figure 5, highlighting the point that decisions taken in land use planning, such as a change in zoning, may take 10 years to become apparent, and may have unintended consequences (Bai 2007).

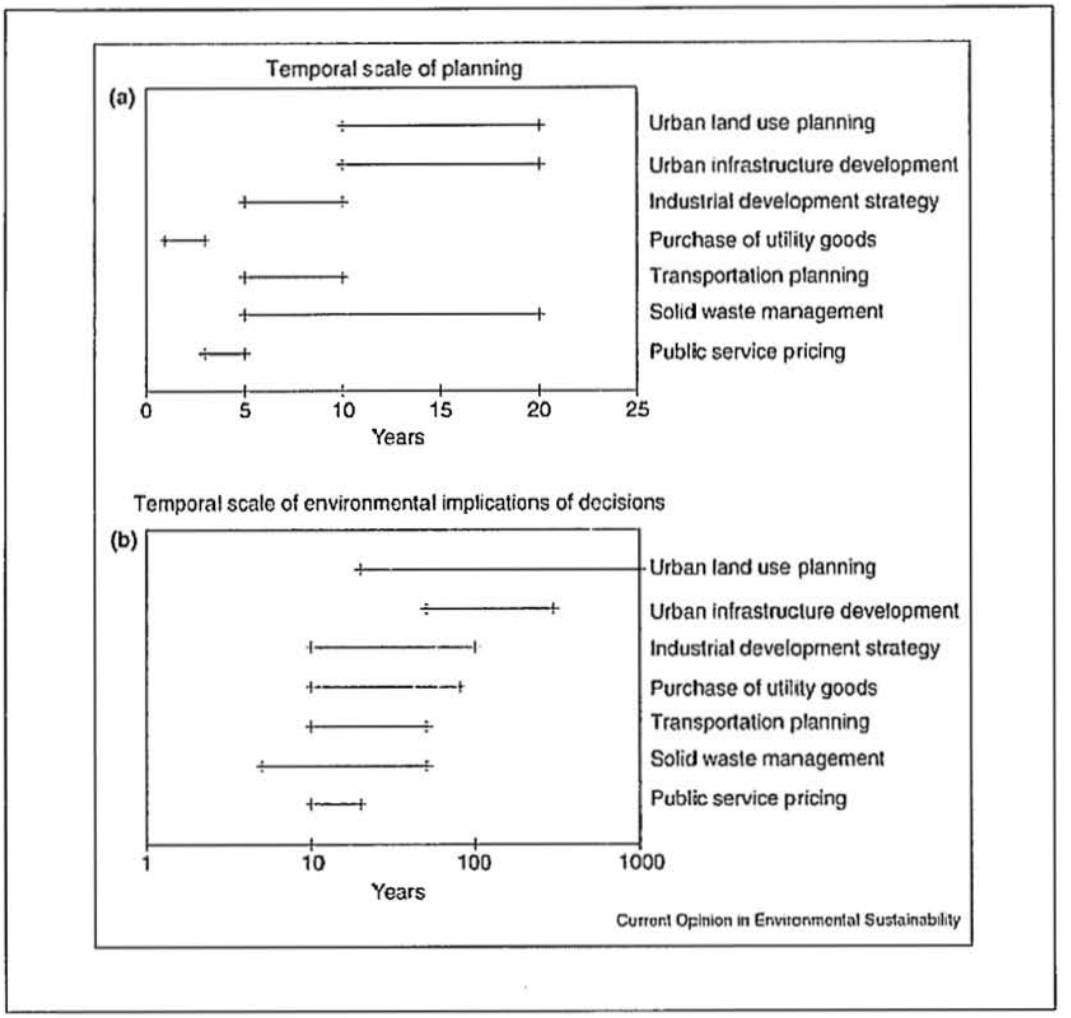

Figure 5. Temporal scale of decision making (a) Temporal scale of planning (b) temporal scale of environmental impacts of planning decision

Source: Bai (2007)

The temporal scale of land use planning and infrastructure development shown in part (a) of Figure 5 suggests that the environmental implications of decisions being made now will affect those who live there for a long period of time to come. Hence the need to understand what decisions might be made in the near future to reduce the likelihood of creating longer-term problems. Consequently the linkages between science and policy, adaptation, mitigation and planning, emergency

management and hazard preparedness all become more important (Bai 2007; Bai 2010).

Mitigating the impacts of coastal hazards and adapting to long term effects of climate change, are, therefore, part of the wicked problem described in the introduction – that any action taken to address a problem may fix it under a certain set of conditions but may also cause other problems later (Rittel and Webber 1973). However, in the literature there remains significant faith in the capacity of land use planning to reduce the vulnerability of the human environment to coastal hazards and lessen the need for emergency responses (Beatley 2009; Burby 1998; Pilkey 2009; Randolph 2004; SES 2010).

2.3 Governance

In the Tasmanian context the RMPS has provided a framework for land development and management since 1993/4. In the System sustainable developments is defined as "managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health" (RPDC 2003, p.2).

The RMPS requires each level of government to apply integrated assessment processes for sustainable land use planning whenever it is involved in mitigating or adapting to coastal hazards. In addition, the integrated assessment process by local government supports a decision framework that gives communities ownership of the mitigation strategies for impacts of coastal hazards. The

importance of building community resilience using knowledge and action is outlined in the Brundtland Report from 1987 and Agenda 21 agreements produced at the United Nations Conference on the Environment and Development in 1992 (Beatley 2009).

The objectives of the RMPS are outlined in Schedule 1 of the Land Use Planning and Approval Act (1993) and are to:

- promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity;
- provide for the fair, orderly and sustainable use and development of air, land and water;
- encourage public involvement in resource management and planning;
- facilitate economic development in accordance with the objectives set out above; and
- promote the sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in the State (see also RPDC March 2003, p.6).

Several sections at Part 2 of Schedule 1 describe the objectives of the planning process as:

> (a) to require sound strategic planning and co-ordinated action by State and local government; and ...
>
> (f) to secure a pleasant, efficient and safe working, living and recreational environment for all Tasmanians and visitors to Tasmania; and ...
>
> (h) to protect public infrastructure and other assets and enable the orderly provision and co-ordination of public utilities and other facilities for the benefit of the community (Schedule 1 Part 2, LUPAA, 1993).

The Tasmanian Planning Commission (TPC) guide to the RMPS provides an overview of the operation of the System and the tools to support it (RPDC 2003). These tools include a requirement for a whole of government (local and state) response to planning, providing for the development of policy, planning, and strategy to meet the needs of the wider community (Table 2).

Relationships and responsibilities for coastal hazards and land use planning under the RMPS are depicted at Figure 6. Note that the State Emergency Management Committee (SEMC) manages the overall response to coastal hazards in Tasmania (DPAC, 2010).

The primary relationship shown in Figure 6 is between local governments and the Tasmanian Planning Commission; it is complicated by involvement of other agencies including the Department of Police and Emergency Management (DPEM), State Emergency Service (SES) and Department of Primary Industries Parks Water and Environment (DPIPWE), which are charged with identifying and managing coastal hazards via emergency responses, impact mitigation, and the use of science.

Figure 6 also maps the relationship contexts in which land use planning, emergency responses, community consultation, agency engagements, and organisational participation multiply seek to mitigate the impacts of land use planning.

Table 2. RMPS – acts, tools and outcomes

RMPS Core Acts	Tools	Outcomes
• Land Use Planning and Approvals Act 1993 • Resource Planning and Development Commission Act 1997 • Resource Management and Planning Appeal Tribunal Act 1993 • State Policies and Projects Act 199; • Environmental Management and Pollution Control Act 1994 • Historic Cultural Heritage Act 1995 • Major Infrastructure Development Approvals Act 1999	• Planning schemes o Zones and overlays • Strategic plans[2] • Management plans[3] • Part 5 agreements[4] • Registers[5] • Integrated assessment[6] • State policies[7] • Planning directives[8] • Advisory notes[9] • Hearings • Regional planning[10] • Development applications[11]	• Strategic planning • Flexibility and currency • Whole-of-government approach • Public participation • Monitoring the state of the environment • Integrated development assessment[12]

Source: adapted from RPDC 2003, pp.3-7

[2] Strategic plans are created under the Local Government Act 1993 and providing guidance on the future use of land, implemented through the planning scheme as outlined in LUPAA 1993.
[3] In this context, management plans relate to the management of an area of land for the environmental, heritage or cultural values, they may also include structure or master plans (TPC 2010a).
[4] Part 5 agreements are between the planning authority and a land owner regarding the conditions of use for the land (LUPAA 1993).
[5] Registers relate to a list of features such as heritage locations which require developments to be consistent with the values on the register.
[6] Integrated assessment refers to refers to the consideration of environmental, social, economic and community issues relevant to the project (SPPA 1993).
[7] State policies are created under the State Polices and Projects Act 1993, for the protection, planning and management of land, in which they override planning scheme controls which are inconstant with the policy (SPPA 1993).
[8] Planning directives are created under Land Use Planning and Approvals Act 1993 to direct Planning Authorities to respond to the matter contained in the directive, such as the state coastal policy. The purpose of this is to ensure all planning authorities affected by the directive implement the contents, including the alteration of the planning scheme (LUPAA 1993).
[9] Planning advisory notes explain statutory provisions, providing guidance to councils on the planning system (TPC 2010a).
[10] In this context, regional planning refers to the north west, northern and southern regional planning projects for the production of regional strategic plans (LUPAA 1993).
[11] Development applications are created under Land Use Planning Approvals Act 1993 legislation for the regulation of the land use and development in a local government area (LUPPA 1993).
[12] Integrated development assessment refers to the consideration of environmental, social, economic and community issues relevant to the project (SPPA 1993).

In Figure 6, these relationships show that while councils and TPC have primary responsibility for land use planning around coastal hazards, other agencies have input into the mitigation of the hazards via land use planning. This point is worth examining in more detail in relation to three of the actors involved, as follows.

First, the role of local government is to provide for the health, safety, and good governance of the community. It is also expected to develop local and regional planning schemes, giving consistency between adjacent planning schemes, development controls, and part 5 agreements (LGA, 1993 and LUPAA, 1993). In this light, Figure 6 shows that decisions on land use planning fall between elected officials and management and staff. The elected official's role is one of decision maker in strategic planning, statutory and policy making in line with the Local Government Act 1993, while management and staff provide advice and services in line with the council's policies and strategic plans, enforcing and making decisions under delegation from the planning authority.

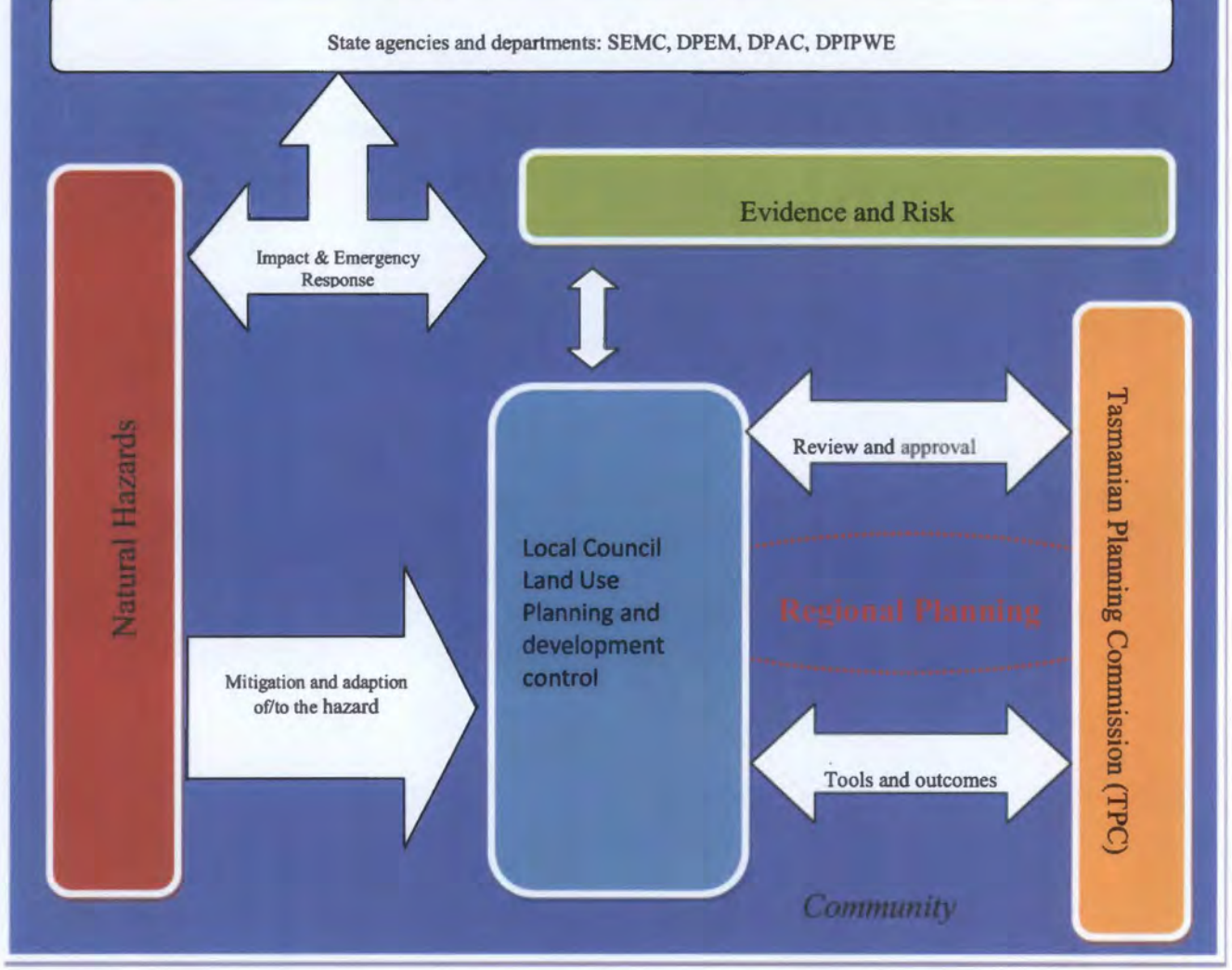

Figure 6 Coastal hazards and organisational relationships

Source: LUPAA 1993, LGAT 1993, SES 2010

Second, the role of the Tasmanian Planning Commission is outlined in the Tasmanian Planning Commission Act (1997) as the peak statutory planning body in the Tasmanian resource management and planning system. The statutory tasks included the performance of tasks outlined in legislation as outlined in Table 2, in addition the commission responds to requests given by relevant ministers with including the Minister for Planning of the Minister for Police and Emergency Management. It is under this direction that the TPC has undertaken a coastal vulnerability project, which is yet to be released publicly (TPC 2010). The TPC also oversees the regional planning initiatives (shown on Figure 6) in the development of strategic regional plans.

Third, of all of the other agencies with roles mapped in Figure 5, that role pertaining to the SES is worth noting. This is an emergency response agency that aims to provide people in the community with a safe living environment by minimising and responding to impacts resulting from coastal (and other natural) hazards (SES 2009). The SES identifies land use planning as one of the key methods to reduce the impacts of coastal hazards, identifying key agencies to address coastal hazards shown in Table 3. Along with the Australian Local Government Association's Report into land use planning, coastal hazards and risk assessment, it recommends buffering coastlines by applying along the coast various land use types such as recreation and conservation, which are compatible with long term predicted coastal recession (SMEC & IID 2006).

Table 3: Responsibilities for hazard prevention, mitigation, preparedness and response

Hazard	SEMC Advisory Agency	Prevention and Mitigation	Preparedness	Response
Coastal Erosion	DPIPWE	DPIPWE – Resource Management and Conservation Division	Department of Justice Tasmanian Planning Commission (land use planning)	Not allocated
Tsunami and related sea inundation	DPEM	SES	DPEM	DPEM

Source: SEMC Advisory Agencies and Management Authorities: SES 2009, p.9

The foregoing summary suggests that as understandings of the science and risks of coastal hazards change, adaptive planning becomes more complex and demanding and requires an appreciation of the dynamics between science and policy (Briassoulis 1989; Malpas and Wickham 1997; Rittel and Webber 1973).

In turn, the insights gained suggest that adaptive learning – exhibited in Tasmania by the adoption of various acts and policy tools across scales of government – allows for a dynamic framework that accepts mistakes and permits us to learn from them; for Randolph (2004) such learning representing a movement away from the incrementalism that has typified planning in the past.

Certainly, in Tasmania the facility for regularly updating planning regulations is built into planning schemes by a requirement to update planning schemes every five years (LUPAA 1993, s.44). It is, however, unclear if the updating of the

schemes is undertaken, in the context of coastal hazards. Given the amount of land, the number of people, and the volume of assets that are likely to be affected by coastal inundation and coastal hazards in the future, it seems especially important that revision of schemes fully account for such a context, starting immediately.

3. Method of data collection

This chapter outlines the methods used to interview planners from the five participating local governments; lists and explains the questions asked of them; describes the processes by which participating councils were selected; gives relevant details about the participants; and presents an analysis of the data.

The interviews aimed to fill knowledge gaps identified in relation to council practices in land use planning, coastal hazard management, emergency management and climate change adaptation and mitigation. Their twofold purpose was to aid in explaining how coastal hazards are managed in existing land use planning processes at the local, regional, state and commonwealth government levels; and to synthesise that information with other documentary evidence about current land use planning insights, practices and changes. The interviews provided an opportunity for participants [often referred to here as 'actors'] to reflect on the current council practice and planned future directions.

Three interview techniques have been identified: structured, semi-structured and unstructured interviews, each presenting different strengths and weakness that have been listed in Table 4 (Dunn 2005, p.80). Australian Standard AS31010 notes that structured and semi-structured interviews provide opportunities for actors to follow a story to a logical end through one-to-one communication. Here, a semi-structured format was selected as a compromise between the highly structured type of formal interview and the storytelling options of the unstructured format.

Table 4: Interview methods SWOT

Interview format	Strength	Weakness	Benefit to this project
Structured	Questions and answers are comparable Question focused	Inflexible Can ignore evidence because it doesn't fit with questions Little or no clarification of the question	Medium – this would allow interviews to be compared, but would be too formal to allow stories to emerge from the questions
Semi-structured	Interview guided to allow the flexible use of questions Allows the use of core and non-core questions	Answers may not be completely comparable Interventionist and guided by interviewer	High – allows a compromise between storytelling and structured answers as guided by the participant
Unstructured	Flexible and data driven Informant focused Every interview is unique	Hard to compare answers Higher level of preparation	Medium – it would be very difficult to compare answers or direct the questioning to gain the knowledge where it is lacking

Source: adapted from Dunn 2005 and AS31010 2009

The interview process outlined in Figure 7 maps the process undergone from first contact with participants to the transcription and review of interviews. This process complies with the University of Tasmania's Ethics Guidelines (UTAS 2010) for human research in the social sciences.

Figure 7. Interview process and key tasks

Source: adapted from Dunn 2005

3.1 Pre-interview stage

The pre-interview stage includes selecting councils and participants to be interviewed; determining the details of a pre-interview discussion; sending out the

pre-interview package that includes interview questions, a consent form and a project overview; and reviewing the current council literature.

The selection of councils and participants is strategic, utilising the existing experience of the councils and participants as suggested by Mason (2007). Councils selected that were identified as having coastal areas at risk of hazards (outlined in Section 3.1.1). Interview participants were identified by making contact with each council's general manger (outlined in Section 3.1.2).

3.1.1 Selection of councils

The five councils involved in this study were selected on the basis of a Commonwealth Department of Climate Changes 2009 Report (DCC 2009, p.100) and a first pass assessment in it of the risk facing coastal communities around Australia. The DCC report (2009) considered how the Tasmanian coastline would be affected under two sea level scenarios – low range: 0.5m and high range: 1.1m – resulting from climate change. They were selected to participate on the basis of the approximate number of dwellings predicted to be affected by coastal erosion and inundation: Break O'Day (1750 dwellings), Central Coast (1800 dwellings) , Clarence (3000 dwellings), Kingborough (1450 dwellings) and Waratah-Wynyard (1750 dwellings). Also consulted was information provided by the Department of Premier and Cabinet (DPAC), Tasmanian Planning Commission (TPC) and the Local Government Association of Tasmania (LGAT) to ensure that selection of councils for this study was appropriate.

Figure 8 identifies select Tasmanian councils having the highest number of residential buildings at risk from coastal inundation resulting from storm surge

events and a high potential range sea level rise. The four most exposed councils are Clarence, Central Coast, Break O'Day and Waratah-Wynyard. It is estimated that a doubling of sea levels will affect only a comparatively small number of additional homes in most areas, except in the Launceston Council area, which has a significant increase possibly because of its coastal topography.

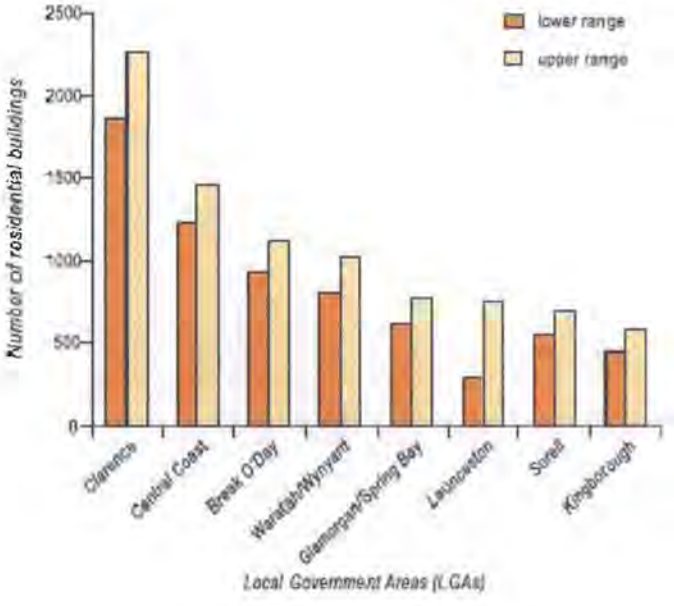

Figure 8. Estimated number of residential buildings affected by coastal inundation resulting from storm surge and sea level rise

Source: Department of Climate Change 2009, p.100

Figure 9 identifies the number of dwellings adjacent to Tasmania's soft shorelines identified in coastal vulnerability mapping. In contrast to the coastal inundation model the number of dwellings affected by coastal erosion increases substantially when the modelled area increases from 55 m to 110 m (Department of Climate

Change 2009, p.99). Clarence, West Tamar, Kingborough and Break O'Day Councils are the four councils identified as being most affected by these coastal erosion scenarios.

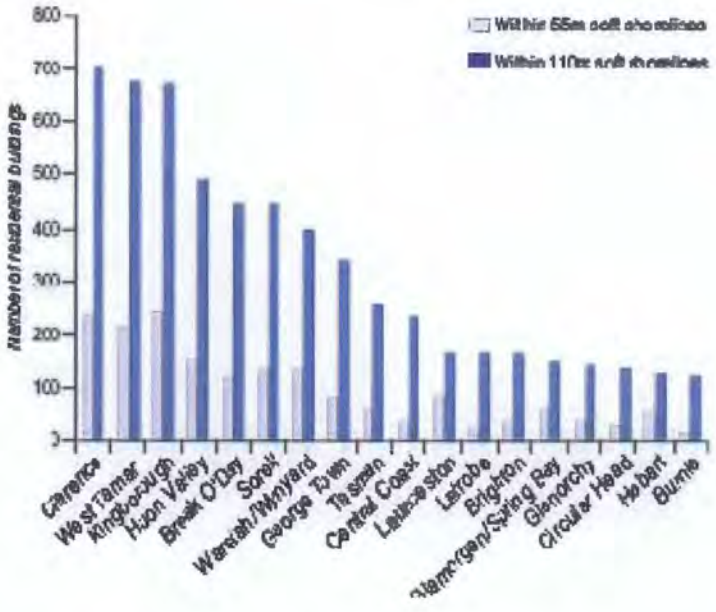

Figure 9. The number of residential buildings potentially affected by coastal erosion

Source: Department of Climate Change 2009, p.102

3.1.2 Contacting the councils

The general manager of each identified council was contacted by the Local Government Association of Tasmania (LGAT) on my behalf and each nominated the senior strategic planner or manager of the planning and building services, providing the contacts to LGAT and the researcher. I then contacted each nominee, providing an overview of the research and arranging a time to meet. An

information pack was sent out to each participant, comprising a consent form, information sheet and the interview questions (Appendix 2).

3.1.3 Interview questions

The interview questions are intended to address each of the thesis objectives, and were divided into broad topic areas covering council planning setup in relation to climate change and coastal hazards and inundation; roles and responsibilities; evidence planning for coastal hazards, risk management strategies for the same; processes to make decisions about risk; and evaluation by participants of processes and summary of the status of planning for coastal hazards (Table 5).

3.2 Post interview

As soon as possible after the completion of each interview, I wrote up interview notations, including personal notes, interview transcriptions and any analytical notes prompted from listening to recordings (Dunn 2005).

The annotated transcripts were returned to the actors for review and comment and two out of five councils provided comment back confirming that the notes represent a true record of the discussion as they recalled it.

Table 5. Questions asked during interviews

Interview section	Question	Purpose
Setting the scene	Name and role? What are you responsible for? a. What decisions do you make and what do you refer to others? Could you outline your career path, training and mentors?	Setting the scene questions provide context for council participants and their personal experiences; this information will not be included in the analysis and has been blanked out in the transcripts, due to ethics requirements.
Roles and responsibilities	**Core question** For natural hazards generally, what information is available to assist in clarifying the roles and responsibilities of 1. State agencies and authorities 2. Regional authorities 3. Planning authorities 4. Individuals or non-government organisations? **Probe questions** What information do you need in this area? Has the council commissioned work to understand the risk which coastal hazards present? Is the council likely to commission such work in the future? Are the current roles and responsibilities effective in mitigating the impacts of natural hazards? If not how would you change them? **Core question** In terms of coastal hazards, who is/should be responsible (multiple answers OK) for 1. Identifying hazard/risk 2. Providing guidance/standards for risk management for coastal hazards 3. Planning control?	This section seeks to elicit information to understand what organisations are responsible for identifying and mitigating coastal hazards and for determining the information they use to support decision making.

Evidence	**Core question** What evidence is available and used by you to 1. Identify the hazards from coastal hazards 2. Assess the risk posed by the development/use subject to a development application (DA) 3. Understand and assess the consequences of future hazard/risk for coastal hazards? **Sub-question** Is the available evidence adequate to confidently underpin a recommendation to the planning authority? What are the top three data sources you use and how do you use these? For example, Sharples *et al.* (2006)?	This question seeks to understand the range of evidence/ reviews/ information (spatial and non-spatial) used to support decision-making. The evidence section also identifies any GIS data sets used to assist in making land use planning assessments.
Risk management	**Core question** In the context of coastal hazards what information/guidance is available to 1. Make recommendations/ impose conditions to reduce risks associated with a use/development to within acceptable levels 2. Assess the adequacies of treatment measures proposed by developers 3. Generally assess the competency of expert advisors?	This section on risk management seeks to understand how risk is measured and managed and determine how advice is treated in decision making processes.
Evaluation and summary	**Core question** How successful are the methods you outlined previously in mitigating the impacts coastal hazards? a. Could you outline any additional tools or support you could use to manage risks of coastal inundation and erosion through land use planning? What are the top three issues facing your council in mitigating the impacts of coastal hazards, and how would you like to see them resolved? Is there anyone else you would recommend that I talk to about this? Do you have any questions of me? What haven't I asked but should have?	Finally, the evaluation and summary section brings the interview to a close, asking participants to identify tools, issues and solutions that they would like to see employed to deal with some of the issues they have discussed in the interview.

4. Analysis

The aim of this research is to explore current land use planning practices among select Tasmanian councils. In particular I am asking "How are decisions regarding dynamic problems made in complex dynamic systems?" This question helps in understanding how to improve current methods of land use planning to mitigate the severity of impacts resulting from coastal hazards and to aid adaptation to climate change enhancements of coastal hazards, including through emergency management.

My conversations with planners based in Clarence, Central Coast, Break O'Day, Kingborough and Waratah-Wynyard Councils suggests that the planning system is in transition and in need of leadership, and that there is a collective desire for regional and state based approaches to coastal hazards. The interviews provided rich perspectives on the planning process, with stories emerging about successes and challenges experienced in addressing coastal hazards and the change which climate change represents. Results have been structured into an overview and thematic analysis of the results. That analysis integrates information about planning schemes and base information as appropriate (Mason 2007), enabling a comparison of qualitative generalisations (interviews) with quantitative generalisations (planning schemes and GIS data) and relevant literature.

To generate themes for analysis of the interviews I used a three pass assessment: the first a classification of the quote into subject area as outlined in the method, the second assessment identified topic and context, and the third the theme.

In thematically assessing the interviews, broad cross-contextual generalisation may be made (AS31010 2009; Mason 2004). Learning's that emerged from the analysis were grouped into the following themes: capacity, integration, communication, and tools. Aspirations for the future directions will be included in each of the themes in the following synthesis and discussion as appropriate. Particular focus is on quotes from the actors to enable their voices to be heard (Dunn 2005; Mason 2007) and in what follows their words are in italics for ease of recognition.

Focus has also been on making links to relevant literature, including planning schemes, State policies, State directives and GIS layers. In tying the themes together I have drawn out generalisations synthetically (Mason 2007). Note that the quotes, classified into subject areas and themes, are outlined in Appendix 3 – Results, and a reference number is placed at the end of each quote for indexing when used. Full annotated transcripts supplied to councils for review are also provided at Appendix 4, with the names of the actors removed as per ethics guidelines.

As a general reflection on the interviews two of the five actors responded with comments relating to the annotated transcripts; during three out five interviews two actors from given councils attended the interviews, including managers of Planning and Development Services, directors, strategic and junior planners, and Natural Resource Management (NRM) officers. The actors were experienced officers, having at least 10 years experience in planning and local government with the exception of one who is a graduate planner.

4.1 Capacity

Capacity on council involves resourcing, specialist knowledge and financial ability and has been identified by participants as a composite issue within their local governments when coastal hazards are considered. Specialist knowledge of coastal hazards relates to their identification and assessment, with one actor noting *council does not have a coastal engineer working for them [who is] able to assess this type of work, and to my knowledge no other council has this either* (E6). Concurrently, participants identified that development applications are often assessed on the basis of *local experience in the council* (RM13) or they *currently rely on local knowledge and background knowledge of staff* (RM17). This reliance on local knowledge to assess a specialist field may affect consistency and is, in turn, affected by pressure to approve: *council needs to ensure that council is applying a consistent standard to assessing incoming reports* (P1). In one council, staff turnover has been pronounced and that, too, may affect capacity.

The lack of specialist knowledge required to prepare assessments and the loss of historical knowledge associated with staff turnover presents a problem not just limited to councils – it was also noted that there are a limited *number of expert people* [consultants] *able to do the work* (RM19).

Given limited financial and staff resources to prepare base information and policy, a council *is unlikely to prepare the advice on risk, hazard and mitigation of its own accord until the risk becomes immediate* (RR33). This lack is reflected by participants across all councils, and they noted that until a coastal hazard becomes an immediate problem council is not likely to act without State direction.

Solutions to capacity problems suggested by the actors include the development of a *reference manual stating what they should be looking for, such as for the landslip areas with a range of acceptable treatments and mitigations* (E21).

The preparation of base information by a third party about coastal hazards and risk would be a benefit: *the smaller councils would get to a policy position if they had some data to hang off, the council is not able to spend a lot of money preparing the base information themselves, the state should prepare the base information, the council just can't afford it given small rate bases, thus policy making becomes more reactive and just in time* (Sum29).

In relation to this statement the indicative vulnerability mapping completed by Sharples 2004/2006 was commissioned by the Department of Primary Industries and Water, publicly released to councils, with only Central Coast and Clarence Councils formally integrated this information into the planning controls or developing policy based on this information. Break O'Day, Kingborough and Waratah-Wynyard use it as a guide: the reason for the lack of implementation is unknown but it may relate to the influence and approval requirements of the Planning Authority, capacity in governance including competing demands for resources regarding the development of strategic policy and practice. Under the RMPS the use of planning directives and regional planning initiatives can help to overcome barriers to implementation either through raising the importance of the issue in the council through the regional approach or requiring a change to the planning scheme to be implemented (LUPAA 1993).

Finally, in relation to regional planning projects and Planning Directive 1 (TPC 2010), clear provisions in planning schemes would reduce confusion for planners and the public: *New scheme amendments will hopefully provide more guidance to the public, so that they can meet the acceptable solution ... [and] ones which don't meet [the solution] this council may have to forward on to other parties for assessment* (E6). The provision of clear planning controls and guidelines for new development, assists in the development of capacity in the community and planning staff in making decisions on the appropriateness of the development in the context of coastal hazards (Beatley 2007; Randolph 2004).

While I am not directly investigating the political nature of decision-making in councils in relation to the development of coastal hazard policy, I recognise that a failure to act on coastal hazard information may be viewed as a failure of governance (Beatley 2007; Burby 1998; Guston *et al.* 2000; Guston 2001; Palmer 2010; Pilkey and Young 2009; Randolph 2004; Malpas and Wickham 1997). Now, as a generalisation, councils find it difficult to respond to changing understandings and requirements relating to coastal hazards resulting from staff turnover, lack of specialist knowledge and limited financial resources; this situation is part of the wicked problem of governance and the design of most organisational processes to manage for a given point in time and a *capacity* (Rittel and Webber 1973). The challenge of capacity makes it difficult to meet the requirements of LUPAA 1993 or the State emergency plan (SES 2010) and no amount of strategic planning to facilitate greater resilience will be effective without ability to regulate interactions between communities and coastal hazards. A potential consequence of this shortfall in capacity is that changes in practice

will be forced on councils by emergency events such as severe storms or erosion or the lowering of land values over time (Attwater and Witte 2008; Beatley 2007). Participants suggested that solutions may be found in writing a coastal hazards assessment handbook, in collaborating to produce clear planning scheme controls, and in mapping coastal hazards. This view is supported by current literature about tools to assist in the building of resilience and capacity at the local level (Beatley 2007; McGuire and Silvia 2010; Randolph 2004).

4.2 Integration

In this context, integration focuses on scale and relationship between coastal hazards and governance. Currently the integration of policy and practice for coastal hazard planning and management between local and State Governments is only partly clear. As a generalisation the State is responsible for identifying hazards and risks, and for creating policies and standards about these for communities to meet. Local councils are responsible for identifying the particularities of how communities will respond to a hazard, and for applying regulations and adaptation strategies in relation to these. Individual landowners are responsible for risks on their lands.

It has been established above that interviews identified both a need for greater capacity in land use planning and assistance with defining the coastal hazard. This need includes a requirement for specific organisations to be responsible for policy, and for identifying and managing coastal hazards at various levels of government and involving planning authorities, emergency management committees, State agencies and individuals.

In Chapter 2, I noted that an objective of the RMPS is for integration, cooperation and shared responsibility among State and local governments, the public, and industry (LUPAA 1993, Schedule 1). I found that participants are largely unclear about who is responsible for identifying and interpreting coastal hazards, with one commenting that there is *very little information to clarify roles...* [with regard to identifying and mitigating coastal hazards] (RR34). Another noted that *council, does not have a clear position of what to do about* [identifying coastal hazards], *and* [told me] *that council would wait until the regional planning initiative is complete before they begin to formulate a position on this* (RR32). The participants showed a strong common purpose to identify who should be responsible and for what.

Councils have adopted a variety of responses to integration, with some taking leadership roles in the collaborative identification of coastal hazards, the development of planning controls and hazard identification. This lead is shown in Clarence (CCC, 2009), and in the development of a strategic action plan for climate change in Central Coast or the identification that a response is needed as in Kingborough (KCCb 2010; Stretton 2010) as a precursor to in-depth studies on coastal hazards and climate change. Without doubt, councils also look to regional planning projects or the State for leadership in the identification and implementation of coastal hazard responses.

Some actors suggested that it has been insufficient to release research about coastal hazards such as that captured in Sharples' 2006 report unless policy is enacted simultaneously to make councils identify areas at risk and the values they

would like to protect and how to respond. Such observations infer a lack of integration of governance regimes.

In addition, actors universally agreed that individual developers must share in the responsibility for integrative decision-making, and in particular must accept the risk of new developments in coastal areas. Noting that the *individual has a responsibility under the scheme to prove that their development is of a low risk* (RR19); that *little onus* [for the development] *is being put back on the applicant or developer to prove what they want to do* (RR12); that *before they can get their permit [developers should] have to identify the hazard then respond to it ... make it safe* (RR25); and the *individual is responsible* [for the development] *and the planning system is there to assist with this* (RR25).

Strategically the actors recognise the responsibility of local and State governments in the identification of coastal hazards and understand that *if it you leave* [the identification of coastal hazards] *up to the individuals then you will get a mosaic of responses and* [it will] *be very expensive in the long run* (RM9). They also acknowledge that *council has met a fair bit of resistance to the requirement of community members to complete coastal vulnerability reports for adjacent properties ... it would be better for council to have an understanding of what has got to happen so that the advice can be given at the earliest possible stage and avoid a unreasonable impost to the community and allow better management of the existing developments* (E30).

Reliance on individual property owners, as outlined above, is recognised as a barrier to strategic development, and to efficient and adaptable approaches to

coastal hazards (Beatley 2009; May 1998; Stuart *et al.* 2006) causing *the planning aspects of the profession to be lost* ... [and increasing the chance of] *losing the ability to strategically plan better communities* (RM9). Other consequences of tiers of government not establishing a position on hazard extent and risk is a reduction in a council's ability to assess the application that *makes it difficult for council to assess the accuracy and the risk level* (E12), potentially representing a failure of governance (Malpas and Wickham 1997). Such a state of affairs opens a decision to challenge by an applicant at the Resource Management and Planning Appeals Tribunal[13] were potentially adverse decisions being made, council then potentially carries the responsibility for the safety of any given development, and may be required to change mitigation polices. As one actor commented *if council does give an approval we are saying that* [the development] *is going to be safe* (RM6). All of the actors stated that the approach taken by the Clarence City Council involving hazard assessment, mapping and development controls (CCC 2007) was appropriate for controlling potential developments, and could be emulated, in their councils.

Indeed, a common thread throughout this study was the observation that if a council does not define policy and strategic planning around coastal hazards then a mosaic of development standards and risks will arise. This is not to say that individual property-owners are not responsible for development and for their land; rather that standards and legal requirements should be implemented within an agreed framework.

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[13] The RMPAT is the resource management, planning and appeals tribunal created under the Resource Management and Planning Appeal Tribunal Act 1993, for the purpose of hearing appeals relating to land use planning and to promote sustainable development (RMPAT 2010).

Additionally, if a council specifies a policy and scheme, but does not map and define at-risk coastal areas, then a financial burden is placed on developers to do their own risk analyses. Developers are unlikely to have the best available information to make decisions and, for small developments, will be required to conduct significant coastal assessments out of proportion to the size of development.

I found that the actors had consensus about the role of governments in the response to coastal hazard as required in LUPAA (1993), suggesting this should include identification, mitigation, and adaptation to coastal hazards. It was also commonly noted that most councils typically lack the resources to do these tasks individually.

All levels of government have a role to play in the climate change and natural hazards space,

- *Commonwealth – funding,*
- *State level – funding and policy relating to climate change...*
- *Regional planning ... to develop polices and model scheme for the region to pursue, more related to the local government level*
- *Local government ... impact on the community, through statutory* [controls] *to ensure that future developments don't go into a areas at risk of erosion or inundation. If they do then council requires a coastal vulnerability assessment* (RR08)

Participants also suggested that the relationship between levels of governance be further enhanced *to work out in conjunction with state government how to protect*

coastal settlements, which are vulnerable (RR7). Cooperation will bring greater integration and ownership in the development of protection and management plans, becoming particularly important as councils respond to the existing communities which are vulnerable, one actor noted that by *getting the planning right, society only has to pay to fix up the old stuff* (sum 21). In integrating the planning to ensure the future developments are consistent has linkages to the capacity (previous section) in the communities for the adaption and resilience to emergency events and climate change induced sea level rise.

Councils typically need information including base mapping of coastal hazards and risks, and regional and state strategic frameworks for coastal hazards. One actor suggested that the *thrust needs to centre on standardising the response to climate change* (R34). This view is supported by current literature that identifies the need for a cooperative approach including consistent base mapping of the coastal hazards to a single standard, and the development of a framework, which allows an adaptive response to a hazard as understanding, evolves (Beatley 2009; Burby 1998; Henstra 2010).

Similarly, participants felt that all levels of government need to be involved in identifying coastal hazards and working out roles and responsibilities involved in response to these hazards. As one actor said *the actual hazard should be responded to consistently everywhere in Tas*[mania] [and] *the actual qualities of the coastline and the differences of the coastlines will pop up different* [local] *responses* (RR30). Unpacking this observation provides two levels of response: the framework and the application to communities. Burby (1998) suggests that in order to better facilitate this relationship partnerships be developed across levels

of government, with a focus on sharing responsibility (as required by LUPAA 1993), suggesting that a committee or organisation is formed to facilitate the implementation of hazard science into policy at State and local levels.

In this regard, Olshansky and Kartez (1998) discuss the importance of state controlled system for the management of coastal hazards to support the plans implemented at local levels. In the context of Tasmania this 'control' is achieved through the RMPS and the cooperation required between State and local government in which "policymakers must also decide upon the appropriate roles of different levels of government in land use and development management" (May 1998, p.58).

Participants argued that identifying coastal hazards and the risks they pose is a State Government responsibility with one participant saying that *ideally [the State] should have done the mapping for us*. Most participants thought that mapping and assessing risk is beyond the capacity of councils, with the response requiring a regional or State approach, especially given that some of the factors involved in mapping hazards relate to State or Commonwealth policies such as the rate of climate change-related sea level rise, as discussed in Chapter 2.

On balance, the actors agreed that while the development controls and mapping should be consistent. Participants recognise that councils must develop responses to hazards that reflects local values and resources, also mindful *that the planning system cannot fix all the problems...* (Sum 21). This idea is supported by Olshansky and Kartez (1998) and Beatley (2009) who describe the importance of

building local capacity in local institutions by creating local plans and developing community ownership in response to hazards.

4.3 Communication

The success or failure of land use planning for coastal hazards hinges on the involvement of members of any given community – they are, after all, the people affected by planning (Beatley 2009; Henstra 2010; Olshansky and Kartez 1998; Zehner and Marshall 2007). The importance of the community in mitigating the impacts of natural hazards is clear, with one actor commenting that *the scientific and technical studies will not amount to a 'hill of beans' if the community is not brought along with the studies at the same time. [A] strong element in climate change actions is to ensure the community is brought into the conversation* (Sum4).

Several actors noted that it is hard to communicate in the present the impacts of coastal hazards expected 50 or 100 years hence when current and future hazards and risks are unknown: *this lack of base information* [about hazard, climate change, risk or extent] *is where we lose the lay people* (RM1). [The] *biggest argument against climate change is that the science keeps on changing; this loses the lay people* (Sum5), this concern is of pertinence given the current debates in the scientific community on the calculation of coastal erosion rates and the multiple scenarios for sea level rise as outlined in the literature review. One actor described how staff 'sold' the increase in vulnerability to coastal hazards, resulting from climate change by arguing that the role of council is one of risk management, elaborated on in section 3.5 below. *Council needs to put the*

strategies in place to manage that risk in the same way as OH&S; once it is explained in that context it becomes easier to get it through council (Sum14). This point underlines the importance of base information, and the sensible and perceptive communication of coastal hazards as risks to council that also require attention to community participation, transparency and education, all of which are required as part of the objectives in the RMPS (LUPAA 1993).

4.4 Tools

Certain triggers and standards in planning schemes, certain risks and certain base data are part of the mechanics of land use planning for coastal hazards. First, triggers and standards outline what current planning schemes (and planning scheme amendments) specify in relation to coastal hazards. Second, each council understands risk differently: for example, in the language and method of calculation recommended. Third, key data sets identified by the councils to assists in the assessment of coastal hazards also vary. These three tools, and the uses that councils put them to, are analysed below in light of quotes from actors and insights from current literature as appropriate.

4.4.1 Triggers and standards

The planning schemes of the five councils involved in this study vary in age from 1996 to 2007, with an amendment (relating to coastal hazards) to Clarence Council's scheme currently under consideration by the TPC. The planning schemes are solutions-based, allowing developments to meet an acceptable solution or specified performance criteria if they trigger further assessment.

In Table 6 (below) the triggers and standards column outlines the variety of triggers current in the planning schemes pertaining to the five councils participating in the study. These variations create a mosaic of responses across schemes, reflecting variation in scheme style and age; this folds back to the challenge of integration.

Currently Clarence and Central Coast Councils' scheme incorporates coastal hazard overlays to trigger further assessment, with the current coastal hazard areas are based on the indicative vulnerability assessment by Sharples' 2004/ 2006 work. Clarence Council currently has an amendment with the TPC, based on the recent SGS using community-level information. Participants from other councils stated that they use either environmental management zones or Sharples' 2006 vulnerability maps as a guide, but this information alone does not trigger further assessment.

Table 6. Summary of schemes, triggers, and data sets

Local Government Area	Scheme	Triggers and standards	Risk	Initial assessment on the map ability of triggers	Information - data sets
Kingborough City Council	Scheme - 2000 Standard and performance based with acceptable solutions	• Floor level 3m above the high water mark (schedule 1, issue 2) • Within the coastal area (500m from coastline unless broken by development) • Further than 30m landward of a active dune system (schedule 1, issue 2) • No less than 50m from a cliff edge (schedule 1, issue 2)	Acceptable solution and demonstration that risk is acceptable based on the risk matrix (schedule 1, issue 4)	Unable to define the high water mark, suggesting the use of the mean high water mark used for the coastline data set. No current mapping know for the extent of the active dune system	Sharples 2006 LiDAR (climate futures) Air photo Applicant studies Planning scheme zones
Clarence City Council	Scheme - 2007 Performance based with acceptable solutions	• Assessment against the performance criteria if the land is affected by the overlays: • Current overlays: • Coastal inundation • Amendment • Coastal erosion, storm surge, • Inundation, sea level rise	Current scheme talks about not increasing risk Amendment: Risk less than a 1% annual return interval, otherwise management provisions would need to be in place (CCC 2009, pp. A4)	Hazard and vulnerability have been mapped under a range of scenarios and scales (regional and community)	Planning scheme zones and overlays LiDAR (Climate futures) Air photos Sharples 2006 Applicant studies
Waratah-Wynyard Council	Scheme - 2000 Performance based with acceptable solutions	• 6m set back from environment zone (mapped in scheme) • Development not to occur with 3m of the high water mark for the spring tide	Scheme talks about risk to property, but does not outline how to define it	Environment zone is mapped	LiDAR Air photo Applicant studies Sharples 2006 WWC Scheme overlays (correct to cadastral parcel)
Central Coast Council	Scheme - 2005 Performance-based with	• 2.64m AHD • 90m behind the 2.64m contour	Flood prone land less than 1% ARI Flood vulnerability report	Identifies vulnerable coast land as in Sharples' 2004 work	LiDAR Air photo

	acceptable solutions	• Vulnerable land	including a statement of risk on site and adjacent property by a suitably qualified person. Demonstration of compliance with building code		Sharples 2004 Applicant studies Planning scheme zone and overlays
Break O'Day Council	Scheme - 1996 Performance based with acceptable solutions	• 300 mm above the high water mark – by default through Building Standard • Urban zone, Issue 6, p.36 , Natural resources zone -- Issue 8 , p59 & environmental protection zone, Issue 10, p.73: state for land affected by natural hazards • Acceptable: no development on land which has a high risk from inundation, storm surge or sea level rise • Performance: areas of moderate risk must demonstrate that property or lives are not at • Siting of development codes Issue 3 – development of coastal landforms, p.127 • No development on the coastal dune system unless risk is not significant and it is demonstrated to comply • 30m from a sea ward cliff or coastal landforms or demonstrate that it will not interfere with the coastal processes. • A method to determine risk is not defined.	No development in high risk areas Areas with a moderate risk must demonstrate that lives and property are not at risk, or at increased risk (p.36) Scheme does not outline how to define risk	Requires the applicant to undergo a process of discovery to identify the hazard, risk and consequences. Council then reviews the application based on local knowledge.	Applicant studies Sharples 2006 Planning scheme zones and overlays

I was told there are *no direct tools under the scheme to consider inundation or erosion; however the following schedules relate to it: waterways and wetlands schedule and sitting and development schedule* (E22). Furthermore, one actor revealed that the *process* [for assessing developments in areas of potential inundation*] was clumsy as the modelling said it would flood; a better planning system would be to not allow floor levels in places you know will flood* (E12), the context for this is that the modelling for the inundation only occurred during the RMPAT hearing process. The Building Code of Australia requires a free board (floor height) of at least 300mm above known flood heights or the 1 in 100 annual return interval (ARI) (BCA 2006).

The variation in scheme triggers and provisions has been identified by actors as a barrier to the successful treatment of coastal hazards, with one actor noting that a *common criticism of planning schemes is that they all have different measures and performance criteria. The intention of the State is to regularise these things through the model planning scheme – same terms, criteria and meaning, calculations* (Sum6).

As the current triggers have a great deal of variation between them and are not clear in themselves, assessment by the council or the community of what is allowable in relationship to coastal hazards is difficult at best and impossible at worst.

4.4.2 Risk

Risk is defined by AS301010 (2009) as the combination of the probability of an event and its consequence. All Tasmanian planning schemes use the language of risk, bringing the perspective of emergency management in coastal hazards to land use planning, as noted in Chapter 2. Adapting to the impacts of coastal hazards becomes a question of what levels of risk the members of any given society are prepared to accept.

Actors were clear that risk relates to the themes of integration and communication, and comments in this respect include one observation about a council that *has worked hard to develop the mapping of the vulnerable coastal areas ... focused on the at-risk areas* but which *did not extrapolate the data* (RR15). Another noted that the *individual has a responsibility under the scheme to prove that their development is of a low risk* (RR19) and another commented *Council is unlikely to prepare the advice on risk, hazard and mitigation of its own accord until the risk becomes immediate* (RR33). One participant observed that the *applicant must do a [risk] study, [and] this makes it difficult for council to assess the accuracy and the risk level , high or medium [without a base line risk assessment]* (E11). Another argued that *if the area triggers a study then it becomes the individual's responsibility to provide evidence and mitigation of hazard and risk* (E18). This summation infers that the concept of risk is strongly embedded in current council thinking, but also

relies on the capacities of individual developers to gauge risk with little guidance.

Recall that Table 6 outlines the tools used to identify and quantify risk in planning schemes, classifying these into qualitative and semi-quantitative categories (AS31010 2009). Kingborough, Waratah-Wynyard and Break O'Day Councils use qualitative measures (high, medium and low), with only Kingborough providing an explanation matrix outlining how to determine the risk. That is shown at Table 7 (below) and provides a clear indication of the vulnerability and risk presented to a development.

Conversely, Waratah-Wynyard and Break O'Day councils use comparative risk such as "having a high risk of flooding" (BODC 1996, p.36) to require developers to define both hazard and risk without then defining what they consider risk to be. Without defining the method of calculation, term or the comparison then *the method under the scheme of identifying risk made it clumsy and open to being challenged by developers who lodge misleading information* (E12).

Table 7. Risk criteria for sea level rise and storm surge

Location	Level of risk
Within 30m measured horizontally of HWM and <3m above AHD	High
Between 30m and 100m measured horizontally of HWM and <3m above AHD	Moderate
Within 1000m of HWM measured horizontaly and <3m above AHD	Low

Source: KCC 2000, p.107

In comparison Central Coast and Clarence councils use semi–quantitative and quantitative methods with risk based on the annual return interval for events and the potential impact of events. The Central Coast Council asks that a suitably qualified person make the assessment and this amount of work has met with resistance in the community. Currently the Central Coast climate change action plan (Stretton 2010) provides for the completion of a detailed coastal vulnerability assessment, in a vein similar to that required by Clarence Council, with a preference for a regional approach. Clarence provides the tools to calculate the encounter probability using the annual exceedance potential (consequence) and annual return intervals (probability) (Table 8).

The tables are directly linked to the overlays in the scheme and are accurate to the community/parcel level. This tool gives developers information to make informed decisions on their proposals before they are submitted for assessment.

Table 8. Tables to calculate the encounter probability in Clarence Council

Source: CCC 2009, pp.A3-A5

Table D 2. Indicative Average Excedance Probability (AEP) of inundation on maps

Colour	Depth	Indicative AEP of inundation for sea level rise				
		Present SLR=0.0m	2050 mid SLR=0.2m	2050 high SLR=0.3m	2100 mid SLR=0.5m	2100 high SLR=0.9m
Beige	d>0.3m	1.0%	6.5%	18.1%	76.0%	100.0%
Yellow	d<0.3m	1.0%	6.5%	18.1%	76.0%	100.0%
Purple	d<0.3m	0.125%	1.0%	2.5%	18.1%	100.0%
Orange	d<0.3m	0.05%	0.33%	1.0%	6.5%	96.4%
Light blue	d<0.3m	0.0067%	0.05%	0.143%	1.0%	39.4%
Dark blue	d<0.3m	0.000125%	0.001%	0.0025%	0.02%	1.0%

Table D 3. Indicative inundation depths of shaded areas in 100 yr ARE (1% AFP) event

Colour	Greater or less than	Indicative potential inundation depth (m) for sea level rise				
		Present SLR=0.0m	2050 mid SLR=0.2m	2050 high SLR=0.3m	2100 mid SLR=0.5m	2100 high SLR=0.9m
Beige	greater than	0.3	0.5	0.6	0.8	1.2
Yellow	less than	0.3	0.5	0.6	0.8	1.2
Purple	less than	-	0.2	0.3	0.5	0.9
Orange	less than	-	-	0.1	0.3	0.7
Light blue	less than	-	-	-	0.2	0.6
Dark blue	less than	-	-	-	-	0.4

Table D 1. Indicative Average Recurrence Interval (ARI) of inundation on maps

Colour	Depth	Indicative ARI of inundation (years) for sea level rise				
		Present SLR=0.0m	2050 mid SLR=0.2m	2050 high SLR=0.3m	2100 mid SLR=0.5m	2100 high SLR=0.9m
Beige	d>0.3m	100	15	5	0.7	0.01
Yellow	d<0.3m	100	15	5	0.7	0.01
Purple	d<0.3m	800	100	40	5	0.1
Orange	d<0.3m	2,000	300	100	15	0.3
Light blue	d<0.3m	15,000	2,000	700	100	2
Dark blue	d<0.3m	800,000	100,000	40,000	5,000	100

Encounter Probability (Probability of Exceedance) for Given ARI/AEP and Project Life

ARI	10	20	50	100	500	1000	2000	10000
AEP	9.5%	4.9%	2%	1%	0.5%	0.1%	0.05%	0.01%
Project Life (years)	Probability of Exceedance (%) for Design ARI (years)							
1	10.00%	5.00%	2.00%	1.00%	0.20%	0.10%	0.05%	0.01%
5	40.95%	22.62%	9.61%	4.90%	1.00%	0.50%	0.25%	0.05%
10	65.13%	40.13%	18.29%	9.56%	1.98%	1.00%	0.50%	0.10%
20	87.84%	64.15%	33.24%	18.21%	3.92%	1.98%	1.00%	0.20%
50	99.48%	92.31%	63.58%	39.50%	9.53%	4.88%	2.47%	0.50%
100	100.00%	99.41%	86.74%	63.40%	18.14%	9.52%	4.88%	1.00%

The purpose of the risk assessment is to provide confidence to council that any new development will not increase the risk or make matters worse, noting that *if council makes a reasonable decision using reasonable evidence then liability is reduced* (E12), and that *if council does give an approval we are saying that it is going to be safe* (RM6).

The foregoing analysis suggests that each council effectively calculates the risk of a development differently. The consensus is that a method based on the

Clarence Council experience would help to inform the community and planners about the required standards.

4.4.3 Data sets

Understanding impacts of coastal hazards requires the use of mapping and spatial information. Mapping allows integrated land use planning and assessment, providing the base information to understand the hazard, its impact on people and structures, the risks involved and the means by which to communicate them, and the appropriateness of information in decision-making (Beatley 2007, Randolph 2004). During interviews participants identified the core data sets relied on in providing advice to the community, internally in the assessment of development applications and in the development of strategic advise. The data sets are listed above at Table 6, and it is useful to note that the main data sets to be used include the planning scheme overlays, the indicative coastal vulnerability assessments by Sharples (2006), with LiDAR contours and air photos also discussed.

Currently councils identify areas at *risk areas through the state-wide mapping exercise from Sharples (inundation)* (RR9). Participants refer to Sharples' mapping work from 2004 and 2006, in all five councils either in the relevant planning scheme (Central Coast and Clarence) or as guidance (Break O'Day, Kingborough and Waratah-Wynyard). The Sharples report from 2006 is a first pass assessment, appropriate to be used as guidance in strategic decision-

making as it gives in principle indications of where susceptibility to erosion or inundation may be found (Sharples *et al.* 2008). Central Coast Council uses Sharples' 2004 maps and extents to underpin the definition of vulnerable coastal land, which it takes to mean "land identified as being within the maximum predicated 2100 sea level rise" (CCC 2005, p.128), identifying areas which will require areas a coastal vulnerability assessment, and potentially the performance solution.

Clarence Council uses two sets of coastal vulnerability mapping. The first is the Sharples report (2006). The second is the recent coastal vulnerability assessment at the community represents a third pass assessment, this assessment is currently being considered by the TPC as an amendment to the Clarence planning scheme. Under the proposed amendment to the Clarence planning scheme mentioned above, Sharples' (2006) mapping will be replaced by community level mapping, identifying vulnerable areas in the most at risk locations fitting in with the three pass assessment of coastal hazards (CCC 2009; see also Gale and Heinjus 1991; Randolph 2004, Sharples *et al.* 2008). It is this style of third pass assessment which might plausibly be used to make planning decisions for developments and the communication of potential vulnerability in local communities in contrast to the first pass indicating susceptibility (Sharples *et al.* 2008).

Participants from Break O'Day, Kingborough and Waratah-Wynyard councils identified Sharples' (2006) coastal vulnerability assessment as a guide in their

assessments, noting that *Sharples highlights where there may be an issue and when you can safely ignore the problem, otherwise you would require every development to provide a coastal hazard assessment* (E18).

Participants also suggested that the process of assessment would have been better if *council had all of the flood levels modelled and on a GIS with LiDAR ... an accurate model of flood and risk* (E13) and acknowledged that data were too coarse for community or detailed town planning, having a scale of 1:25 000 (Randolph 2004), with one actor saying that *Sharples 2004 [is] only used as guidance* (E22).

As a generalisation the data sets identified during the interviews do not provide the detail required to complete development application assessments and on the whole (Clarence excepted) do not provide what is required to develop long-term strategies to address coastal erosion and coastal inundation hazards; to prepare for emergency management situations; or to use the land use planning system to build resilience of the sort lauded in the literature (Beatley 2009; Burch 2009).

4.5 Summary of results

The ways in which coastal hazards are managed in existing land use planning processes in Tasmania has been reviewed in light of the literature, interviews with actors at councils and current planning scheme provisions and information on which decisions are made. The results have provided insights into the

current practices informing land use planning for coastal hazards, particularly in terms of capacity, integration, communication and tools. Various mechanisms appropriate to adaptation and the mitigation of coastal hazards are lacking, including strong and consistent land use plans with risk-based provisions (Randolph 2004), and the more robust use of triggers and implementation of stronger planning provisions (Attwater and Witte 2008). The comprehensive provision and use of spatial and aspatial information by various stakeholders is also lacking. These findings lead to the last theme, which deals with aspirations, and with impediments to their fulfilment – a not-uncommon result when dealing with wicked problems.

5. Conclusions

In this study, I addressed a 'wicked problem' (Rittel and Webber 1973), asking how are decisions regarding dynamic problems made in complex dynamic systems? My aim was to understand how to improve current methods of land use planning to mitigate the severity of impacts resulting from coastal hazards and to aid adaptation to climate change enhancements of coastal hazards, including through emergency management.

I completed interviews and a comparative analysis of planning scheme provisions and spatial data sets to understand current and possible future strategies for emergency management and land use planning. In particular I thought about the interactions between and among **coastal hazards, land use planning** and **governance** (Figure 2). The **coastal hazards** element outlines the science behind hazards, including what those hazards are, the factors that contribute to them, the areas they affect and the evidence or modelling to make decisions on. Thinking about coastal hazards means thinking about the data sets used to make decisions about requirements for spatial, attribute and temporal accuracy. **Land use planning** reviews the tools used to mitigate and adapt to the impacts of coastal hazards, considers the strengths and weakness of using land use planning for coastal hazards.

In seeking to understand lessons from the experiences of planners working in Tasmanian councils about what they do to contribute to coastal hazards

mitigation and adaptation it is clear that they are dealing with a wicked problem, but a solution is not apparent, if indeed one can be (Rittel and Webber, 1973). Their comments nevertheless provide insights about changing understandings of coastal hazards and the need to address these hazards in a sustainable and integrated way.

In this work, I focused on five of the 29 councils in Tasmania; Break O'Day, Central Coast, Clarence, Kingborough, and Waratah-Wynyard Councils. These were chosen as among the councils most exposed to coastal hazards. Mindful of the overarching principles for mitigating and adapting to the impacts of natural hazards through land use planning systems, and requirements, set out in the literature review, for integrated risk-based hazard land use planning, I have come to an understanding of existing hazards and potential risks, and reached the conclusion that much more in the way of capacity building, communication, risk assessment, and integrated action is needed in order to effectively plan our way out of trouble before major impacts become apparent. Such aspirations are shared among the councils' planners.

In conversation, those planners identified various aspects affecting their **capacity** to identify and respond to coastal hazards; namely the loss of historical information due to staff turnover, lack of speciality knowledge and limited financial resources. These limitations have resulted in the use of reactive planning where change is forced on councils through emergency events such as severe storms or erosion.

In a call for the **integration** of schemes, responses, and skills many respondents highlighted the need for common regional and state-wide approaches to controls in planning schemes; some of this is underway in regional planning projects and proposed common scheme templates. Nevertheless, it is apparent that the planning system is not working well when evidence exists of an incoherent mosaic of responses to the risk of coastal hazards currently generated within and between councils, between councils and communities, and across tiers of government.

To bring about a common approach to coastal hazards the State Government should be responsible for the identification of the hazard, risk, policy and standards developers should meet; local councils should be responsible for identifying how communities will respond to the hazard, the regulation and adaptation measures; and individual landowners should be responsible for the risk on their land.

Insights from participants, supported in the literature, and related to **communication** outline the importance of keeping communities involved in the process of land use planning for coastal hazards, as they are also responsible for the success or failure of a response to such hazards.

Triggers and standards, risk and data sets currently used in the planning system are critical to consider. The observation in this study that there is a large variation in the quality and quantity of **tools** used by different councils

supports the previous conclusions that it is essential to have a common approach to coastal hazard planning and management, and that this demands integration at regional and State levels. The variety and history of planning schemes and standards is limiting local government's ability to respond strategically and develop capacity in council and the community and address coastal hazards effectively.

This observation is further demonstrated by analysis of the spatial variation of triggers in schemes – from a 6m setback from the environmental zone in Waratah-Wynyard to the identification of parcels at risk in Clarence. The calculation of risk is currently highly variable across councils, and one solution to this situation may be to develop common risk measures and tools for planners and the community to apply such as the AS 31000 (2009) risk management standards. Measures and tools, such as these would foster the application of a consistent standard of development for risk in all locations.

In terms of the datasets identified the planning schemes the consensus among participants was to follow Clarence Council's lead and develop community level hazard mapping for coastal erosion and inundation, giving the current hazard and identifying the future potential hazard as climate change becomes more significant.

Finally, to honour the **aspirations** of planners participating in this study for integrated planning and capacity building using better tools and better communication **further research** is identifed itself as follows:

- Broadening the research out from planners in local government to include emergency services, State Government agencies and community groups to gain a broader understanding of the needs of those organisations that deal with coastal hazards.
- Developing risk assessment tools and hand book for planners and the community who deal with coastal hazards, in a vein similar to that used in the Guidelines for Development in Bush Fire Prone areas of Tasmania handbook (TFS 1998).
- Undertaking research into adaptation to climate change enhanced coastal hazards, including 'defence, retreat and notification' policies and public expectations.
- Developing capacities for the maintenance of data sets appropriate to land use and hazard planning and assessing if planning scheme controls and responses are supported under a risk based planning method.
- Gauging the role that publicly available spatial information plays in development applications and community ownership of information.
- Gauging the role of elected officials, and of governance and decision making in local government as it relates to changing understandings of coastal hazards.

- Developing combined hazards community protection plans and communicating these to the community while providing a method or methods to integrate such plans with planning schemes.
- Quantify the relationship between the rate of change for land use and changes in the zoning that governs the land, this would extend the work Bai 2007 as discussed in the literature review, outlining the factors that increase or decrease rates of change including climate change.

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Appendix 1 – Ethics

Social Science Ethics Officer
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Tasmania 7001 Australia
Tel (03) 6226 2764
Fax (03) 6226 7148
Marilyn.Knott@utas.edu.au

MEMORANDUM

HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

MINIMAL RISK ETHICS APPLICATION APPROVAL

24 June 2010

AssocProf Elaine Stratford
Geography and Environmental Studies
Private Bag 78
Hobart

Ethics Reference: H11231

Mitigating the impacts of natural hazards through land use planning - focus on coastal inundation and coastal erosion.

Student: Luke Roberts (Masters)

Dear AssocProf Stratford

Acting on a mandate from the Tasmania Social Sciences HREC, the Chair of the committee considered and approved the above project on 24 June 2010.

Please note that this approval is for four years and is conditional upon receipt of an annual Progress Report. Ethics approval for this project will lapse if a Progress Report is not submitted.

The following conditions apply to this approval. Failure to abide by these conditions may result in suspension or discontinuation of approval.

1. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval, to ensure the project is conducted as approved by the Ethics Committee, and to notify the Committee if any investigators are added to, or cease involvement with, the project.

2. Complaints: If any complaints are received or ethical issues arise during the course of the project, investigators should advise the Executive Officer of the Ethics Committee on 03 6226 7479 or human.ethics@utas.edu.au

3. Incidents or adverse effects: Investigators should notify the Ethics Committee immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.

4. Amendments to Project: Modifications to the project must not proceed until approval is obtained from the Ethics Committee. Please submit an Amendment Form (available on our website) to notify the Ethics Committee of the proposed modifications.

5. Annual Report: Continued approval for this project is dependent on the submission of a Progress Report by the anniversary date of your approval. You will be sent a courtesy reminder closer to this date. **Failure to submit a Progress Report will mean that ethics approval for this project will lapse.**

6. Final Report: A Final Report and a copy of any published material arising from the project, either in full or abstract, must be provided at the end of the project.

Yours sincerely

M Horder

Melanie Horder
Ethics Officer

Appendix 2 – Information sheet

PARTICIPANT INFORMATION SHEET (PROFORMA)

SOCIAL SCIENCE/ HUMANITITES

RESEARCH

Mitigating the impacts of natural hazards through the use of land use planning. Focus on coastal inundation and coastal erosion.

Invitation

You are invited to participate in a research study into in the practice of land use planning relating to the natural hazards of coastal inundation and coastal erosion.

The study is being conducted by Luke Roberts, UTAS, Masters of Environmental Planning - student.

'What is the purpose of this study?'

This study considers the following questions:

What are the overarching principles in the mitigating/ adaption to the impacts of natural hazards through the land use planning system?

At local, regional and state levels what are the strategic considerations and tools available in the mitigation/adaptation to the impacts resulting from coastal inundation and erosion?

How are natural hazards managed for in existing land use planning processes at the Local, regional, State and Commonwealth government levels?

Recommend improvement to support the planning authorities to mitigate the impact of natural hazards through the LUP process in the mitigation of the impacts resulting from coastal inundation and coastal erosion?

2. 'Why have I been invited to participate in this study?'

You have been invited to be involved in the study as a planning officer in your council.

4. 'What does this study involve?'

The study will involve telephone and face to face interviews which are expected to take no more than an hour of your time. Upon completion of the interview, a summary of the conversation will be provided to you for your review and annotation.

It is important that you understand that your involvement is this study is voluntary. While we would be pleased to have you participate, we respect your right to decline. There will be no consequences to you if you decide not to participate, and this will not affect your treatment / service. If you decide to discontinue participation at any time, you may do so without providing an explanation. All information will be treated in a confidential manner, and your name will not be used directly in any publication arising out of the research.

5. Are there any possible benefits from participation in this study?

This study will provide information into the current practice surrounding the mitigation of natural hazards using land use planning.

If we are able to take the findings of this small study and link them with wider work in the climate change and natural hazards mitigation fields, the result may

be valuable information for others and it may lead to improved support for council planners, the community and emergency services.

6. Are there any possible risks from participation in this study?

There are no specific risks anticipated with participation in this study. However, if you find that you are becoming distressed you will be advised to receive support from UTAS or alternatively, we will arrange for you to see a counselor at no expense to you.

7. What if I have questions about this research?

If you would like to discuss any aspect of this study please feel free to contact myself (Luke Roberts) on ph 0417 236 250, Elaine Stratford (03) 6226 2462. Either of us would be happy to discuss any aspect of the research with you. You are welcome to contact us at that time to discuss any issue relating to the research study.

This study has been approved by the Tasmanian Social Science Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study should contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. You will need to quote H11231.

Thank you for taking the time to consider this study.

If you wish to take part in it, please sign the attached consent form.

This information sheet is for you to keep.

Appendix 3 - Results

Experience

Results are not presented for this section as per ethics

Roles and responsibilities

Council	ID	Quotes	Theme
Central Coast	RR1	"Dealing with the existing development is not easy, the issue is Council does not have the statutory responsibility, consequently the council has taken it upon themselves to take the strategic lead"	Integration
Central Coast	RR2	"lots of competing demands in councils, as what is important to one council is not as important to other councils, consequently without central control it is unlikely that schemes standardise things"	Integration/capacity
Central Coast	RR3	"it has been highlighted in the action plan that Central Coast has nominated $100k (as an indicative figure) to do the in-depth work and would prefer to do this at the regional level. "	Integration/capacity/ responses
Central Coast	RR4	"CC has indentified an action in the strategy to undertake a scientific and risk assessment of central coast to work out what the priorities are as part of the broader project"	Integration/ tools
Central Coast	RR6	"Central Coast is more impacted than Kentish, Latrobe or Devonport, with Central Coast and Waratah-Wynyard the	Integration

		most impacted on the north west."	
Central Coast	RR7	"need to work out in conjunction with state government how to protect coastal settlements which are vulnerable"	Integration
Central Coast	RR8	"All levels of government have a role to play in the climate change and natural hazards space Commonwealth - funding State level - funding and policy relating to climate change, build on the climate change strategy Regional planning – not a formal level of planning, but tasked to develop polices and model scheme for the region to pursue, more related to the local government level Local Government – deal with how the things are going to impact on the community, through statutory limits, to ensure that future developments don't go into areas at risk of erosion or inundation. If they do then council requires a coastal vulnerability assessment."	Integration/capacity/ community
Central Coast	RR9	"council has identified at risk areas through the state wide mapping exercise from Sharples (inundation) – it has been highlighted in the action plan to do the in-depth assessment (based on Clarence), council's preference is to complete this task on a regional basis, rather than council by council"	Integration/tools

Central Coast	RR10	"regional strategies have been set up to give consistency across the region... however there is no funding currently for the project to continue once the current funds run out. Cradle Coast Authority may take this on, however this may be difficult as getting the councils to work together and getting them to agree on something contentious is difficult"	Integration/capacity/tools/ community
Central Coast	RR11	"regional planning seems to stumble in the committees of the Upper House"	Integration
Clarence Council	RR12	(14.29) "important thing is that our provisions put into force do not preclude any development anywhere. What it does do is highlight that in certain areas you need to prepare certain documentation, which may include a report which justifies your particular proposal. We were very conscious not to introduce any new no go areas. Politically this is very difficult – as soon as you put a black mark on a site – and also it enables us to make an assessment on the information provided to us, rather than assuming that the information we have is gospel and won't change, a little bit of onus is being put back on the applicant or developer to prove what they want to do"	Integration/ community/ tools
Clarence Council	RR13	"looked at the current day hazard lines and then looked at a 2050 and 2100 hazard lines with sea level rise" "comfortable with this model. This experience shows that the distance inland is not the same anywhere as the coastal geology, fetch and other factors influence the hazard under different scenarios"	Integration / tools

Clarence Council	RR15	"Clarence has worked hard mapping the vulnerable coastal areas.... focused on the at risk areas, did not extrapolate the data around"	Tools
Clarence Council	RR16	"New information has basically changed the polygons but also enabled Clarence to revisit the provisions... effectively beef up the inundation controls as we know more than before... have come up with a set of tables which say that if you live in this area then your floor areas must be above this height, if so this would be a permitted use, if the floor levels do not meet the minimum heights then additional documentation is required to justify why this is not a problem" [applicant to provide a solution and council to review].	Tools/integration/ community
Clarence Council	RR17	"gets beyond planning as they will have to adapt to climate change in terms of providing safety for its existing infrastructure and communities first how much do they do, and if they do"	Integration/tools/ community
Clarence Council	RR18	"..... also identify areas where we actually look at planned retreat, at this stage this has not been addressed, but council is aware of these issues. Over the coming years they will be pressured by the community and state to work out how they will they address these issues"	Tools/integration/ community
Clarence Council	RR19	"The individual has a responsibility under the scheme to prove that their development is of a low risk"	Community/ tools
Clarence Council	RR20	"... at some point council needs to be comfortable that they have done everything	Tools/community

		it can reasonably do to protect its communities. It was Clarence's view that this work needed to be completed"	
Clarence Council	RR23	(25.35)"Ideally the state government should have done the mapping for us."	Integration/ tools
Clarence Council	RR24	"at the moment council has not seen people actively doing this sort of work... historically council is more often than not reactive and more likely to address an issue when they see something which should not have happened in the first place and attempt to regulate it then."	Community/tools
BODC	RR25	"NRM is here to ensure that soil, water and natural process are sustained, not to protect people from floods "– individual is responsible and the planning system is there to assist with this. "Planning scheme is set up for the individual developers to respond to hazards, before they can get their permit they have to identify the hazard then respond to it... make it safe"	Integration/tools
BODC	RR26	I7.30 min "climate change response advice to council was written in to my PD partly because it is seen as an environmental problem, but my response is that it is not a environmental issue at all, it's an economic and social one, but yes I can help you to work through that. So I obviously take issue with that (idea that) natural hazard management should be in the environmental management sector– it's actually in the economic and social sector where anyone is there doing anything about it." "Value judgement for at what point is it okay to impact on coastal process and at	Capacity

		what point is it not. Rather than approach from the position that erosion is the problem, the value is the coastal process and problem is the development... scheme is trying to protect this idea" "Restricts development from coastal process, sand movement but that's not erosion"	
BODC	RR27	"Planning scheme covers all known natural hazards through schedules, zones and siting, flooding, is both coastal and river, land stability, coastal erosion is covered under land stability. Talks about maintaining coastal process... how does it sit with places already. If council knows that the coast is eroding then the developer will need to address the land stability issue. Value judgement for at what point is it okay to impact on coastal process and at what point is it not. Rather than approach from the position of the erosion is the problem, the value is the coastal process and problem is the development...scheme is trying to protect this idea" "we don't have any flooding areas on map, talks about high and medium hazard.... we have anecdotal evidence about where floods go to" "The building code requires the floor height to be 300 mm above any known flood level which sits secondary to the planning system" "Council has a filtering system which deals with high and medium risks, but the actual method to determine this is not clear and up to the proponent to define... makes sense as the individual takes on their own judgement"	Tools/integration/ community/ capacity

BODC	RR29	21 mins "From the planning side best to stay on the onus of the applicant to respond, the process of the applicant discovering that there is an issue and how to respond to that could be refined and improved with mapping for support information. At the moment it is a bit hit and miss as an applicant could say that my land is not flood prone, we could say that it is, then it goes to appeal and everyone is pulling in scientists to determine whether it is flood prone which is expensive on the individual basis. 21.50 "Better to invest now and get clear information of what we think will be flooded areas, provide upfront advice and people can choose to prove that they are not affected by it. Equally under the current scheme a application may go through because council and applicant does not know that the area floods, this is why the process of discovery of information could be refined"	Community/ integration/ tools
BODC	RR30	21.30 "the actual hazard should be responded to consistently everywhere in Tas. The actual qualities of the coastline and the differences of the coastlines will pop up different responses" Local social values will vary as well, and seek to find expression in local public policy, might be some regional scale similarities, know for coastal erosion 3 regimes exist with Bass Strait, east coast, and the south east. "The other element for the setting of as strategic plan for looking at new development the region should when assigning new areas for development should follow a similar method and	Integration /tools

		identify areas which have a lower impact/ risk in responding to natural hazards over the long term – this is being discussed at the regional project, consensus is that an application in Bridport or St Helens should have to respond in the same way"	
WWC	RR32	" ... council does not have a clear position of what to do about this, and that council would wait until the regional planning initiative is complete before they begin to formulate a position on this." "Current scheme only focus on the dune setbacks"	Integration/tools
WWC	RR33	"Council is unlikely to prepare the advice on risk, hazard and mitigation of its own accord until the risk becomes immediate" "...this should be done on a regional basis otherwise will end up with a haphazard implementation"	Capacity/tools
KCC	RR34	"... Rule of thumb 1 km of coast or a floor level less than 3 m above the high water mark as measurable triggers..." "... Very little information to clarify roles..." "... Sharples, it has no formal basis... far from ideal and best we have..." "Thrust needs to centre on standardising the response to climate" "... better not to have the info than to have quantified the hazard and not do anything around it."	Tools/integration/ community

Evidence

Council	ID	Quotes	Themes
Central Coast	E2	" ...the LiDAR is that CC works for 90m from the 2.64 m contour and the LiDAR is 0.25 m contours"	Tools
Central Coast	E3	"reason for this work is that the council has met a fair bit of resistance to requirement of community members to complete coastal vulnerability reports for adjacent properties. It would be better for council to have an understanding of what has got to happen so that the advice can be given at the earliest possible stage and avoid a unreasonable impost to the community and allow better management of the existing developments"	Tools/ community/ capacity
Clarence Council	E6	"Current scheme does not provide a lot of guidance, it has been difficult for council to identify the right person to assess information given to it, for example, should it be a planning officer, an engineer or farmed out to a consultants" "council does not have a coastal engineer working for them able to assess this type of work, and to my (DF) knowledge no other council has this either". "New scheme amendments will hopefully provide more guidance to the public, so that they can (assist with) meeting the acceptable solution... with ones which don't meet this council may have to forward on to other parties for assessment."	Tools/ community/ integration

BODC	E11	"applicant must do a study, this makes it difficult for council to assess the accuracy and the risk level, high or medium "	Tools/ community
BODC	E12	"process was clumsy as the modelling said it would flood, a better planning system would be to not allow floor levels in places you know will flood" "applicant said the risk was not high because the damage was not significant, the event probably happens every couple of years, but don't have the data to support the frequency." "the method under the scheme of identifying risk made it clumsy and open to being challenged by developers who lodge misleading information"	Tools
BODC	E13	"this process would've been handled better if the council had all of the flood levels modelled and on a GIS with LiDAR. an accurate model of flood and risk"	Tools
BODC	E14	"if council makes a reasonable decision using reasonable evidence then the liability is reduced"	Integration /tools
BODC	E15	"Better to invest now and get clear information of what we think will be flooded areas, provide upfront advice and people can choose to prove that they are not affected by it. Equally under the current scheme a application may go through because council and applicant does not know that the area floods, this is why the process of discovery of information could be refined"	Tools/ community
BODC	E16	"From the planning side best to stay on the onus of the applicant to respond, the process	Integration

		of the applicant discovering that there is an issue and how to respond to that could be refined and improved with mapping for support information, at the moment it is a bit hit and miss as an applicant could say that my land is not flood prone, we could say that it is, then it goes to appeal and everyone is pulling in scientists to determine whether it is flood prone which is expensive on the individual basis."	/community
KCC	E17	" Sharples highlights where there may be an issue and when you can safely ignore the problem, otherwise you would require every development to provide a coastal hazard assessment ..."	Tools
KCC	E18	"..if the area triggers a study then it becomes the individual's responsibility to provide evidence and mitigation of hazard and risk..."	Tools
KCC	E19	"..ideal would be able to identify genuine risk under a range of scenarios..."	Tools
WCC	E20	"...Landslip analysis sets the precedence for the state to take leadership in the mapping, analysis and interpretation and policy work for natural hazards" "Currently rely on local knowledge and background knowledge of staff" "... definitive answer for the impact level for a range time dates and tide levels... "	Tools/ integration/ capacity
WCC	E21	"... reference manual stating what they should be looking for such as for the landslip areas with a range of acceptable treatments and mitigations..."	Capacity/ tools

WCC	E22	"Sharples 2004... only used as a guidance" "No direct tools under the scheme to consider inundation or erosion however the following schedules relate to it: i. waterways and wetlands schedule ii. siting and development schedule " "If nothing is triggered under the scheme then the DA will get a permit"	Tools

Risk management

Council	ID	Quotes	Theme
Central Coast	RM1	"The state should provide guidance on: • What the coastal area is • Vulnerable coastal areas • Sea level rise based on 2050, 2100 (as examples) • Hazard and risk management around this numbers and local conditions • This lack of base information is where we lose the lay people"	Integration /tools
Central Coast	RM2	"People who came up with the measure have gone, unable to find the origins of the number " [in relation to 2.64 m and 90 m setback]	Tools/ capacity
Central Coast	RM4	"New scheme amendments will hopefully provide more guidance to the public, so that they can meeting the acceptable solution... with ones which don't meet this council may have to forward on to other parties for assessment."	Integration/tools

Central Coast	RM5	"Section 7.4.6 (stated that council was not responsible) expressed through a part 5 agreement, tribunal has challenged this section and dismissed it, shows that council docs have an obligation that the council's assessment must be suitable for the continued use of the development [sunset clauses on the developments are not allowed], commission approved it and tribunal rejected it –thus it was rejected"	Tools
Central Coast	RM6	"if council does give an approval we are saying that it is going to be safe" (55 55)	Tools
Clarence Council	RM7	"Either through people who authored the report or through an informal arrangement with UTAS and get some of the engineers there to assess this work"	Tools/ capacity
Clarence Council	RM8	"as a planner it is not up to me (DF) to extrapolate out the mapping"	Capacity /tools
BODC	RM9	43.14 "In terms of mapping areas of risk for a determined flood level this could be done more efficiently and cost effectively if it is done once, as councils are the best bodies to try and collect this information individually ... this could be achieved either through councils pooling resources or state government saying this is a state issue completing the work in consultation with councils" "rather than individual councils deciding if it is a issue for them then going out and getting a study done" " If it you leave it up to the individuals then you will get a mosaic of responses and be very expensive in the long run. –this would also cause the planning aspects and profession to be lost ... losing the ability to strategically plan	Tools/ integration

		better communities"	
KCC	RM12	"... Hazards addressed at the time of Sub division " "... No further coastal subdivision happening, unless in a built up area..."	Tools/
KCC	RM13	"... based on local experience in the council, unless it is highly technical then a 3rd party peer review would occur"	Capacity
WWC	RM15	"Councils (not necessarily staff), are political creatures and susceptible to development pressure, can end up with inappropriate development which may or may not come back to bite people on the butt in years to come" sometimes a pressure to approve a. If it looked like a development would come back and be an issue what would the council do? i. Council would take a position which will protect them, in terms of inundation I'm sure council / suppose one of the councils will be tested against the shades of gray with council saying no – the developer will take it to appeal and not sure how the current performance schemes will stack up – especially given the tribunal deals on matters of administration ii. The point is the only time you can exercise discretion is if they don't meet the acceptable solution and then you rely on the performance criteria 1. if they meet the acceptable solution they are permitted and are bound to get a permit 2. That why it is fairly crucial that the regional planning initiative will address the issues we	Capacity/ community

		have been talking about.	
WWC	RM16	"Currently rely on local knowledge and background knowledge of staff", ".... reference manual stating what they should be looking for such as for the landslip areas with a range of acceptable treatments and mitigations...."	Capacity/ tools/

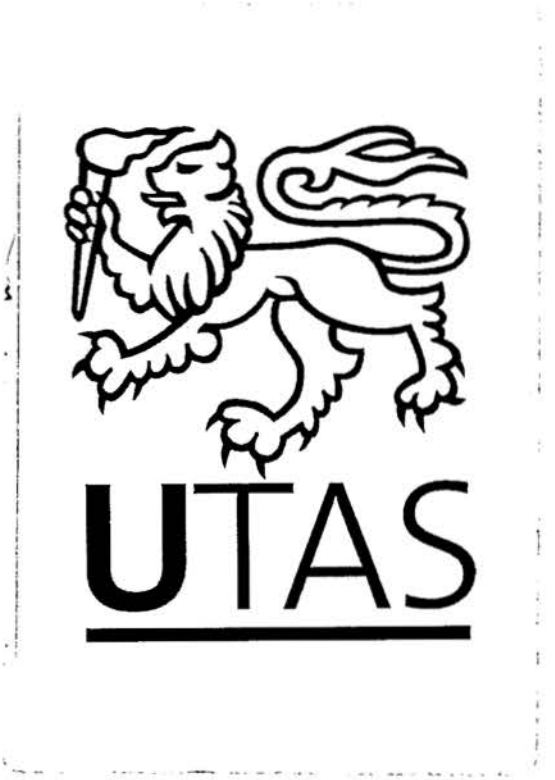
Summary

Council	ID	Quotes	Themes
Central Coast	Sum1	"Provisions of scheme works well"	Tools/
Central Coast	Sum3	"Each council will have slightly different impacts and this should be able to be accounted through the model planning schemes"	Integration/
Central Coast	Sum4	"the scientific and technical studies will not amount to a "hill of beans", if the community is not brought along with the studies at the same time – strong element in Climate Change actions is to ensure the community is brought into the conversation."	Community/ tools/
Central Coast	Sum5	"Biggest argument against climate change is that the science keeps on changing – this loses the lay people"	Community/ tools

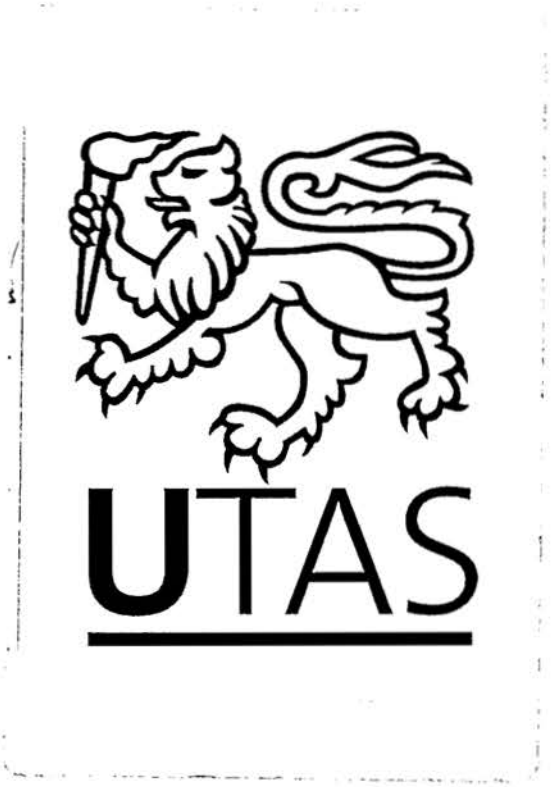
Central Coast	Sum6	"Common criticism of planning schemes is that they all have different measures and performance criteria, the intention of the state is to regularise these thing through the model planning scheme – same terms, criteria and meaning, calculations"	Integration/ tools/
Central Coast	Sum7	"With the next level of work are looking at getting done to the sub parcel level – at least the same level as Clarence, it's the intent"	Tools / integration/
Central Coast	Sum11	"Review of state coastal policy with assistance in the implementation of the policy which was dumped on local council"	Integration/ tools/ capacity/
Central Coast	Sum13	"the local government role is one of risk management. Council needs to put the strategies in place to manage that risk in the same as OH&S, once it is explained in that context it becomes easier to get it through council"	Tools/
Central Coast	Sum14	"CC councils is a mixed council with climate change sceptics, agnostics and believers" [note to self – they still endorse the climate change action plan]	Community
Clarence Council	Sum16	"council needs to form a opinion about how to deal with a event and then adopt a planning scheme to reflect this"	Integration /tools/
Clarence Council	Sum17	"council has to form this opinion and it would be inappropriate for the state government to specify what the council must do for the protection or planned retreat of communities which may be beyond to the resources of the council" "may be appropriate under the local government act to say that councils must	Integration/ tools/ community /

		provide an opinion on the following and provide plans which show where they will defend and retreat, but not say what they should or should not do" "ensuring the council is transparent to the community, for example when a ratepayer comes in to the council and says what are you going to do to protect my house, council can say we have formed the view that we will protect your house for the next 20 yrs then over the next 20yrs you will pay a headworks or you are on your own"	
Clarence Council	Sum20	"Problem with regional planning is that it is enabled through cooperation through councils, councils can opt out – thus may not be as harsh as it could be."	Integration
BODC	Sum21	"A key point is that the planning system cannot fix all the problems... a lot of people believe it can" "Getting the planning right, society only has to pay to fix up the old stuff"	Integration/ capacity/ tools/
BODC	Sum22	"Council needs to stop thinking in a 5 year cycle for natural hazards as they will get out of hand and they will be stuck in a reactive planning cycle to their own infrastructure"	Capacity/ community/ integration/
KCC	Sum24	"... No reason to account for individual (community needs) in CE/CI as it affects everyone equally..." "...l ikely to use the policy phased retreat, okay while you are still there but if it falls down then it's over ..." "the problem with the prevailing theory is that they (the tribunal) want hard evidence and it does not exist" "someone at some stage needs to determine that this might be arbitrary but this is the deal and this is why we fall back on 3 m and	Community/ integration/ tools/

500 m as because property and development opportunity is money in the bank and people need to know before they buy. How do they know, 'I'm sorry sir, you will need to do a risk assessment on the property before you buy it'... and that is an unfair impost... and it is incredibly inefficient and expensive... governments are reluctant to do this as they may get hit by compensation claims"



Appendix 4 – Full transcripts of interviews



Break o'day council - interview Questions – 6/6/2010:

Question broad topic	Question	Summary by annotated transcript and notes (to be completed)	Annotated transcript
Set up	Name and role What are you responsible for? i e what decisions do you make and what do you refer to other roles Could you outline your career training and mentors?		Intro and project review As per notes
Roles and responsibilities Based on the matrix of roles and reasonability	Core question For natural hazards generally what information is available to assist in clarifying the roles and responsibilities of State agencies and authorities Regional authorities, Planning authorities, Individuals or non government organisations Probe questions What information do you need in this area? Has the council commissioned work to understand the hazard/ risk which CE/CI present? Is the council likely to commission work in the future? Are the current roles and responsibilities effective in mitigating the impacts of natural hazards? If not how would you change them? Core Question In terms of CE/CI who is/should be responsible (multiple ok) for Identifying hazard/risk Providing guidance/standards for risk management for CE/CI Planning control	NRM role – nat hazards, good at this point – issue with the term of natural hazard Individual is responsible to id hazards define risk and demonstrate that it is not affected Currently no flood areas have been defined Identifying high, medium or low risks is not clear Process of erosion (disclosure) a issue through Mapping / support Current is hit and miss Who is responsible for 1 hazard identification Applicant must demonstrate compliance with the proposed risk / hazard Council through the scheme No need to map it Resolution and accuracy of mapping an issue Currently have a project on a portion of the George's flood plain 2 Provide guidance / standards Hazard should be respond to in the same way across region Local conditions need to be accounted for Local public positions and values need to be accounted for Strategic plan for new areas of development should ID areas not at risk as well as those at risk	Info available -very limited info -NRM in the room "because nature gets blamed for its impact on us. NRM is good at assisting people coming to terms with the social and economic realities of the hazards Its not really anything to do with nature even though it is at risk its that the business of NRM in helping people coming to terms with nature . nature is not to blame and people have to learn how work with nature" 17 30 min "climate change response advice to council was written in to my PD partly because it is seen as an environmental problem but my response is that it is not a environmental issue at all its a economic and social one but yes i can help you to work through that So i obviously take issue with that natural hazard management should be in the environmental management sector, its actually in the economic and social sector where anyone is their doing anything about it" "NRM is here to ensure that soil, water and natural process are sustained not to protect people from floods individual is responsible and the planning system is there to assist with this" Role for nrm is for facilitation not being responsible for natural hazards "Planning scheme is set up for the individual developers to respond to hazards, before they can get their permit they have to identify the hazard then respond to it , make it safe" Planning scheme covers all know natural hazards through schedules, zones and sitting, flooding is both coastal and river, land stability, coastal erosion is covered under land stability Talks about maintaining coastal process , how does it sit with places already If council knows that the coast is eroding then the developer will need to address the land stability issue 11 20 "Restricts development from coastal process, sand movement but that's not erosion" Value judgement for at what point is it okay to impact on coastal process and at what point is it not Rather than approach from the position of the erosion is the problem, the value is the coastal process and problem is the development scheme is trying to protect this idea Drilling down. -Land slip area on a maps, definition of bushfire areas we don't have any flooding areas on map, talks about high and medium hazard, we have anecdotal evidence about where floods go to "The building code requires the floor height to be 300mm above any known flood level which sites secondary to the planning system" "Council has a filtering system which deals with high and medium risks, but the actual method to determine this is not clear and up to the proponent to define . makes sense as the individual takes on their own judgement" 15 mins: How do they judge that they have it right? Planning scheme is performance based - applicant must demonstrate compliance with all relevant issues before council even has to consider the application, so the onus is on them to examine the development site and identify any natural hazards having said that the council is still the assessing body and must have some awareness of where the natural hazards are occurring anyway, to actually check the material the applicant is providing Is the council going to define the area it believes that have a flood risk or is susceptible to erosion (-) example of bushfire prone areas which has a clear definition and does not need to be mapped, as the vegetation landscape changes Other hazards are the change in the same way, while you can apply the criteria today, tomorrow it might be different thus out of date, but also the resolution and accuracy of the information put through the criteria may be inadequate

			Currently have a project underway on the Georges flood plain which will bring some sense an understanding of these mapped risk levels even case by case so many factors involved, a map may not provide good information for a particular land holder or developer...have to go and see the micro scale to see that it actually might be different to what is shown on the map so bush fire prone are assessment, by leaving it unmapped and making the applicant do the assessment does 2 things, it gets a site specific assessment done by those who need to take on the risk, which is an important process for them to go through. "Whereas if you map it and they act on information you have given them you have a huge liability issues...[hand drawn example of how a bush fire map can change and the implications for use and use rights under land use and approval act] - a farmer can change a paddock from pasture to a plantation (council has no inputs into this) it then corresponding changes the bush fire potential to the surrounding properties – mapped overlays cannot account for this so after the line is drawn, it says this area is not bush fire prone while they actually are. That's why a definition works better than a mapped area (18 55) In terms of flooding areas we have not embarked on the process of mapping them at the very first step with the Georges bay project, which is being done by pit and sherry and seeing how that works on an objective level, and if that works it will be the first domino. 19 mins "Really saying that under the scheme it the individuals responsibility from an NRM perspective as i (--) don't want to be the bunny shouldering all of the load for people who just want to exploit the natural resources and the environmental cost is born by someone else the way the scheme is structured you are responsible to ensure compliance and we all need to pull together to keep this the way we like it You can't just do as you like and expect that a authority somewhere else will just carry the can " 21 mins "From the planning side best to stay on the onus of the applicant to respond, the process of the applicant discovering that their is an issue and how to respond to that could be refined and improved with mapping for support information, at the moment it is a bit hit and miss as an applicant could say that my land is not flood prone, we could say that it is, then it goes to appeal and everyone is pulling in scientists to determine whether it is flood prone which is expensive on the individual basis " 21 50 "Better to invest now and get clear information of what we think will be flooded areas, provide upfront advice and people can choose to prove that they are not affected by it, equally under the current scheme a application may go through because council and applicant does not know that the area floods, this is why the process of discovery of information could be refined" 21 30 "the actual hazard should be responded to consistently everywhere in tas, the actual qualities of the coast line and the differences of the coastlines will pop up different responses" local social values will vary as well, and seek to find expression in local public policy, might be some regional scale similarities, know for coastal erosion 3 regimes exist with bass straight, east coast, and the south east. "The other element for the setting of as strategic plan for looking at new development the region should when assigning new areas for development should follow a similar method and identify areas which have a lower impact/ risk in responding to natural hazards over the long term – this is being discussed at the regional project, consensus is that an application in Bridport or st Helens should have to respond in the same way" No adopted number or scenario for sea level rise in BODC 28 2 – current project on Georges bay has adopted a figure of 1 2 m sea level rise by 2100, this only part of the equation with storm surge, fetch and other factors which contribute to the impact and risk – needs the cumulative risk of existing plus sea level rise for strategic planning A number is useful but it needs to account for the different rises and existing hazards around the state Raises the issue of a 1 2 m line on map may take away the communities need to be aware of the issues, and that community must be engaged in the process – joint responsibility
Evidence	Core Question What evidence is available and used by you to Identify the hazards from CE/CI Assess the risk posed by the development / use subject to a DA Understand and assess the consequences of future hazard/risk for CE/CI Sub Question	State / regions mapping areas at risk of flooding and erosion No base data State should set a bench line Method of IDing risk	Evidence currently available -"applicant must do a study, this makes it difficult for council to assess the accuracy and the risk level, high or medium "– which is important in the scheme tribunal has tested the risk level, which agreed with the council, applicant argued that it was not a high risk, accepted that it would flood but said that it would not be an inconvenience to them Tribunal accepted councils view that you don't put building where you know its going to flood. -process was clumsy as the modelling said it would flood, a better planning system would be to not allow floor levels in places you now will flood -applicant said the risk was not high because the damage was not significant, the event prob happens every couple of years, but don't have the data to support the frequency

	Is the available evidence adequate to confidently underpin a recommendation to the planning authority? What are the top 3 data sources you use and how? for example Sharples *et al* (2008)	Flood levels modelled LiDAR data 337 certificates could carry the warning that an area is prone to coastal inundation and erosion as it currently does for landslip	-the method under the scheme of identifying risk made it clumsy and open to being challenged by developers who lodge misleading information -"this process would of been handled better if the council had all of the flood levels modelled and on a GIS with LiDAR an accurate model of flood and risk" -Georges bay template is based on coastal risk model. but some one needs to take the call on the odds they are will to take some one is will to but the next people int he house may not think this is appropriate does this risk becomes the councils risk as the council allowed it – this has not been tested by council -"if council makes a reasonable decision using reasonable evidence then the liability is reduced" Discussion around the potential role of 337 certificates for making people aware of coastal hazards on the site as it currently does for land slip as a possible tool for communicating risks on the property – state government issue as they are responsible for them (Emma came in to discuss this)
Risk Management	Core Question In the context of CE/CI what information / guidance is available to you to either Make recommendations/ impose conditions to reduce risks associated with a use/development to within acceptable levels, Assess the adequacies of treatment measures proposed by developers, Generally assess the competency of expert advisors,	Aus risk standard has been removed from the planning scheme consequently their is nothing to measure a "moderate risk" against Constant need for an expert opinion A better way of doing this is Clear base line information Clear state policy at state level on concern Likelihood mapping for hazard/risk Clear risk guidelines	43 14 In terms of mapping areas of risk for a determined flood level this could be done more efficiently and cost effectively if it is done once as councils are the best bodies to try and collect this information individually this could be achieved either trough councils pooling resources or state gov saying this is a state issue completing the work in consultation with councils – rather than individual councils deciding if it is a issue for them then going out and getting a study done If it you leave it up tot eh individuals then you will get a mosaic of responses and be very expensive in the long run –this would also cause the planning aspects and profession to be lost losing the ability to strategically plan better communities How do you access the adequacy of treatments Proof and Logic check by council planner External consultants- Chris sharples for flood level
Process (use development assessment example)	Core Question How is evidence and risk guidance considered in your DA process, using a recent DA as an example	Sited an example for a shack which the risk guidelines where wilfully misinterpreted Leigh suggested a clear overlay to prove	As per example above method of assessing risk was under the aus standard (until rpde removed it) involved going through a likely hood and consequence " applicant rated likely hood and consequence as low , this appeared to be an attempt to get it overt the line rather than being genuine" – then it became an appeal as it was an issue with council getting chris sharples in to do a flood assessment. then the tribunal agreed the site was prone to flooding -once it goes to appeal it runs up thousands of dollars in costs for all parties and the tribunal better way to not to go to appeal include Clear base information including mapping about risk and hazards and likely hood are Accurate modelling Clear policy statements on risk, hazard and consequence Understanding of consequences If council had information about likely hood, risk, consequence and hazard then this would not have been able to go to appeal
Summary	Core Question How successful are the methods you outlined previously in mitigating the impacts CI/CE Could you outline any additional tools or support you could use to the management of coastal inundation and erosion through LUP What are the top 3 issues facing your council in mitigating the impacts of CE/CI and how would you like to see them resolved Is there anyone else you would recommend that i talk to about this? Do you have any questions of me? What haven't i asked but should have?	Current scheme provides for a relatively successful mitigation of coastal inundation and coastal erosion – lack of information makes it difficult for people to know before they buy land Strategic policy and risk assessment plan how to mitigate over the long term Strategic planning Policy Emergency management assets	3 issues facing council and how would you like resolve them Knowledge base information – don't know where erosion and inundation will be (some of the existing is known) but potential areas are unknown (– highlights that council has been responding to areas where erosion/inundation is a problem and has required a response) – trigger of the georges study is a private land holder with a erosion/inundation issue and was pushed by SES to form a opinion and not react in a unplanned way – also have an existing flooding problem across the Binalong bay rd during king tides Council needs to stop thinking in a 5 year cycle for natural hazards as they will get out of hand and they will be stuck in a reactive planning cycle to their own infrastructure Short term view of hazards – more expensive in consequences and work Knowledge of long term will allow a strategic planning response Lack of policy / strategic / risk direction (lup ,emergency management own assets) – none exists at the moment Scheme can only deal with new development , existing development needs a policy for what to do including private property and council properties Solution of brad scale risk mapping and focused response – allow a planned response over the long term including withdrawal Council needs to make judgments on the life of assets and the surrounding assets Money General discussion around assets and the loss of those assets – what can the council/community deal with?? Other questions people to talk to? Locally – speak to any councillor or state member as they will have a consensus of this is not an issue and we are at the point where they need to make decisions on policy, they may not do not believe it is an issue – role for planners to start to education them in the consequences of these positions current

			mayor says he won't be here – should talk about the consequence on the current day value of assets Other questions - 1.16 "Getting the planning right, society only has to pay to fix up the old stuff" Need to financial modelling to the consequences of the risks to work out the most cost (social and economic) effective response Council is not involved enough to put money on the consequence – not enough money to do these studies Would like a copy of the paper and findings No clear roles and responsibilities about who council goes to start this process of assessment -Leigh asked if you go straight to Matt Healy for this work 1.21 "A key point is that the planning system cannot fix all the problems, a lot of people believe it can"

Central Coast Council - Interview Questions

Question broad topic	Question	notes	Annotated Transcript
Set up	Name and role What are you responsible for? i e what decisions do you make and what do you refer to other roles Could you outline your career training and mentors?		Introductions as per notes The current planning scheme provides a level of comfort in regards to new planning developments for the consideration of CE/CI factors – through coastal vulnerability assessments "Dealing with the existing development is not easy, the issue is Council does not have the statutory responsibility, consequently the council has taken it upon themselves to take the strategic lead , to facilitate this the council has just had a climate change action plan endorsed by councils which outlines the strategies council would like employ for the foreseeable future to address climate change related issues." Career notes as per the notes section
Roles and responsibilities Based on the matrix of roles and reasonability	Core question For natural hazards generally what information is available to assist in clarifying the roles and responsibilities of State agencies and authorities Regional authorities Planning authorities Individuals or non government organisations Probe questions What information do you need in this area? Has the council commissioned work to understand the hazard/ risk which CE/CI present? Is the council likely to commission work in the future? Are the current roles and responsibilities effective in mitigating the impacts of natural hazards? If not how would you change them? Core Question In terms of CE/CI who ivshould be responsible (multiple ok) for Identifying hazard/risk Providing guidance/standards for risk management for CE/CI Planning control	Developed a climate change action plan All levels of gov have a role Federal funding State - Policy / Funding Regional Planning policy for region Related to region Local – detail and implementation to local conditions State in plan scheme – through a DA process Issues Funding the biggest issue to do the studies Mixture of standards Lack of detailed data Studies need to be completed at the regional level Council has commissioned some projects Set aside some funding for the regional studies No current policy to protect the existing structures/ settlements Use sharples 2006 as a base set of information Higher to do in depth inventory Regional basis partnership for area Based on the planning project Being a lobby for the region Need for a regional body with a funding basis Cooperative arrangement will not work [check this in tape] Council has defined a height of 2 64 m	Sections 2 roles and responsibilities "All levels of government have a role to play in the climate change and natural hazards space Commonwealth - funding State level funding and policy relating to climate change, build on the climate change strategy Regional planning – not a formal level of planning, but tasked to develop policies and model scheme for the region to pursue, more related to the local government level Local Government - deal with how the things are going to impact on the community, through statutory to ensure that future developments don't go into a areas at risk of erosion or inundation, if they do then council requires a coastal vulnerability assessment " Most draw on arrange of information including -state wide information -usually does not have the access a adequate level of information (such as Clarence's) - ultimately this is the sort of work which will need to be done - at some extent it should be done at the regional level – council do focused community level of studies - funding is the greatest issue in this in the past 20years who pays for enviro management work – usually state - local government will need to do more studies and - need to work out in conjunction with state government how to protect coastal settlements which are vulnerable – council will have to deal with the future? - "council has identified at risk areas through the state wide mapping exercise from sharples (inundation) – it has been highlighted in the action plan to do the in depth assessment (based on Clarence). councils preference is to complete this task on a regional basis, rather that council by council" – state (and federal) government have a role in this through funding, coordination and collaboration - this will make it more cost effective for councils to do this work -it has been highlighted in the action plan that Central Coast has nominated $100k (as an indicative figure) to do the in-depth work and would prefer to do this at the regional level (11mins) - "better to make it a $500k project for the whole of the north west and develop strategies for the whole region and to develop storm water management plans which they are going to need adaption and modification for the potential impacts of climate changes...they will begin to start lobbying through Cradle Coast and neighbouring councils that this is what Central Coast wants to do " -" central coast is more impacted than Kentish, Latrobe or Devonport with Central Coast and Wiratah Wynyard the most impacted on the north west " (12 30 mins) - "regional strategies have been set up to give consistency across the region however their is no funding currently for the project to continue once the current funds run out, cradle coast authority may take this on however this may be difficult as it is trying to get the councils to work together and getting them to agree on something contentious is difficult" – "lots of competing demands in councils as what is important to once council is not as important to other councils, consequently without central control it is unlikely that schemes standardise things " "until such time that we have a regional planning body which is formally established through legislation, with its own funding base then i can't see the cooperative arrangement working (14 mins) in terms of a overall program it may struggle this is consistent with the history of regional planning between post WW2 until the last one in 1978 "
Evidence	Core Question What evidence is available and used by you to. Identify the hazards from CE/CI Assess the risk posed by the development / use subject to a DA Understand and assess the consequences of future hazard/risk for CE/CI Sub Question Is the available evidence adequate to confidently underpin a recommendation to the planning authority? What are the top 3 data sources you use and how? for example Sharples *et al* (2008)	Local government Manage perception and community Do technical work LG role of risk management Stormwater management plan Flood risk Capacity of system Stormwater management plan for the next 10yrs Future studies Data sets by Clarence – sub panel??? Realisation that council should have a understanding in this area therefore it will need to something about it Top 3 data sources Consultant repo rts – (with DAs or reports commissioned)	

		Check against eh DB – sharples 2006 Is development in a acceptable level of risk Planning scheme LiDAR Data is really limited to the sharples and consultant reports	"regional planning seems to stumble in the committees of the upper house" Assuming regional basis did start, what studies would you like to see -coastal hazard mapping for a range of scenarios -coastal inundation mapping' studies "values map which gives a range of options over the coast, including areas of defence, planned retreat" "CC has indentified a action in the strategy to undertake a scientific and risk assessment of central coast to work out what the priorities are as part of the broader project" "the scientific and technical studies will not amount to a "hill of beans" if the community is not brought along with the studies at the same time – strong element in Climate Change actions is to ensure the community is brought into the conversation " - "CC councils is a mixed council with climate change sceptics, agnostics and believers" [note to self – they still endorse the climate change action plan] "the local gov role is one of risk management, council needs to put the strategies in place to manage that risk in the same as OH&S, once it is explained in that context it becomes easier to get it through council" "other studies include stormwater management plan ($20K allocated) to identify potential flooding risks to try and plan storms water works over the next 10years, and assist management is a large part of this " "reason for this work is that the council has met a fair bit of resistance to requirement of community members to complete Coastal vulnerability reports for adjacent properties, it would be better for council to have an understanding of what has got to happen so that the advice can be given at the earliest possible stage and avoid a unreasonable impost to the community and allow better management of the existing developments" -when the coastal risk/hazard studies are undertaken they would like it to be of equivalent detailed nature to the current coastal vulnerability studies done - unsure if this is achievable (no reason given) raises the question of if Clarence requires the applicant to undertake an assessment – has a softy softy approach – prepared info and had a discussion with the community – planning scheme change is the last thing to be done top 3 information sources Application is checked against the scheme and database sharples 2006 Is this development within a acceptable level of risk? Land form vulnerability and risk consequence and frequency – suggests 1in 100yr event category changes When is this measured to Planning scheme and sharpies data Secondary is consultant reports Science is monitored LiDAR been excellent data Guided by federal research Improving the quality of the existing data is a very valuable experience Issue with" the LiDAR is that CC works for 90m from the 2 64m contour and the LiDAR is 0 25m contours' How did CC come up with the 2 64 contour? People who came up with the measure have gone, unable to find the origins of the number – could be a judgment about the cumulative affects of storm surge and sea level rise Unknown where the 90m has come from – doesn't account for the geology Hoping for a far simpler mechanism out of the regional planning scheme How do you apply a uniform level around the state Different tide heights Fetch and storm surge effects "Common criticism of planning schemes is that they all have different measures and performance criteria, the intention of the state is to regulise these thing through the model planning scheme – same terms, criteria and meaning, calculations" "Each council will have slightly different impacts and this should be able to be accounted through the model planning schemes" "The state should provide guidance on What the coastal area is Vulnerable coastal areas Sea level rise based on 2050, 2100(as examples)
Risk Management	Core Question In the context of CE/CI what information / guidance is available to you to either Make recommendations/ impose conditions to reduce risks associated with a use/development to within acceptable levels Assess the adequacies of treatment measures proposed by developers, Generally assess the competency of expert advisors	State to provide a model scheme Define base numbers such A level for maximum storm surge A level for sea level rise Areas affected by erosion Areas affected by flooding Testing reports Qualifications of the person Certification Read the report - logic of argument Talk to engineer and NRM to clarify points Still unhappy return to the applicant or get it peir reviewed	
Process (use development assessment example)	Core Question How is evidence and risk guidance considered in your DA process, using a recent DA as an example	Council has defined a potential sea level rise to 2 64m MS does not know where this number came from despite attempts to discover Judgement about the risk and storm surge Would like a simple mechanism (data and provisions) at the regional level	
Summary	Core Question How successful are the methods you outlined previously in mitigating the impacts CI/CE Could you outline any additional tools or support you could use to the management of coastal inundation and erosion through LUP What are the top 3 issues facing your council in mitigating the impacts of CE/CI and how would you like to see them resolved Is there anyone else you would recommend that i talk to about this? Do you have any questions of me? What haven't i asked but should have?	Need location specific work in the state projects? Scheme works well Refinements in mapping – best data available is the sharples 2006 Ability for more regional of work –[Check tape] Refer to state gov Coastal unit does not assist in education of public for coastal management and works??? Review of coastal policy – manage budget Help with CC workshops - lack of capacity State coastal policy Request from LG in the implementation of the policy – currently Council does not have sufficient resources to implement Suggestion to assist local/regional planning Provide cost - hazard, process and values Really LG would have to the work to implement the policy Climate change and CE/CI policy and implementation is bigger issue than local government can deal with Council actions at regional level Mitigation of climate change with emission reductions LGAT had a program call cities for climate protection other responses any process must be transparent to the community increase density and connectivity between developments try to contain development in rural lands Community plans change plan for the community Start the adaption and mitigation process Regional planning is essential for the provision of services and resources	

			Hazard and risk management around this numbers and local conditions This lack of base information is where we loose the lay people" Biggest argument against climate change is that the science keeps on changing – this looses the lay people – better education and engagement What do we call a catastrophic hazard Gradual erosion Economic impacts on the community – loss of infrastructure Loss of life is not as significant issue (less likely to happen due to gradual nature of hazard) Able to predict major storms – water spouts happen on NW coast When you get a treatment how do you test them -hard question -check qualifications and decide if they can trust them or not Have some sort of certification -read the report and check the argument If unconvinced discuss with engineers Still not happy – get it peer reviewed -"want recommendations based on a set of assumptions, which gives a definitive statement and confidence , at the same time council need to ensure that council is applying a consistent standard (7 planners have been there in 3 years) to assessing incoming reports" -when the scheme came in their where not to many people able to do the report – consultants had to train them self's up - cost and service has gotten better over time -if council is still unsure then Get a peer review as per MRT Send to councils consultant Similar process to new fit guidelines – an option Never removes the obligation to the client "With the next level of work are looking at getting done to the sub parcel level – at least the same level as Clarence, its the intent" – need funding support and the regional planning level (sharples is the regional level??) What additional tools would you like the planning schemes, data sets and state gov "Provisions of scheme works well" Refinements in mapping over time – easy access to be included into overlays Assessment are peer reviewed In the past state gov has been the reviewing org – less likely to happen now as they have started charging a fee Coastal unit is mostly focused on education for coastal management and state works, they help with climate change workshops pretty lean org Would be a excellent unit to start the state wide projects Make sure issues are addressed "Review of state coastal policy with assistance in the implementation of the policy which was dumped on local council" – suggestion that the state could provide the base information – coastal values, coastal process (very little info around – would have to do their own and they don't have the resources – state says the same thing) this is bigger than the local issue. Any question i should have asked. Doing works at the mitigation (emissions from council) LGAT took the lead through planet footprint programs Some of the responses are – increasing density of development and improve connection between settlements Better use of existing infrastructure Reduce need for travel Contain development in rural areas Started to develop community plans – a starting point to the placement of assists and infrastructure – opportunities in the strategic phase of planning schemes otherwise it is a negotiation and consultation about where we should be developing – all about relationships and engagements – it can go pear shaped when competing interests Closing and future outcomes for council

Clarence City Council - Interview Questions

Question broad topic	Question	Notes (pre interview)	Annotated Transcript
Set up	Name and role What are you responsible for? i.e. what decisions do you make and what do you refer to other roles Could you outline your career, training and mentors?		Outlined interview process and signed consent form
Roles and responsibilities Based on the matrix of roles and reasonability	Core question For natural hazards generally, what information is available to assist in clarifying the roles and responsibilities of: State agencies and authorities, Regional authorities, Planning authorities, Individuals or non-government organisations. Probe questions What information do you need in this area? Has the council commissioned work to understand the hazard/ risk which CE/CI present? Is the council likely to commission work in the future? Are the current roles and responsibilities effective in mitigating the impacts of natural hazards? If not how would you change them? Core Question In terms of CE/CI, who is/should be responsible (multiple ok) for: Identifying hazard/risk, Providing guidance/standards for risk management for CE/CI, Planning control	State should have done mapping MAST assess all developments below high water mark Regional authorities: Schedules and overlays Planning authorities 7c) yes the council is going to adapt its: Existing infrastructure When and how much ID areas for diff areas ie planned retreat (if this becomes an option) Will be pressured to identify these areas 7d) yes for assessment, requires some improvement to preclude some development s (check against tape 9a) state coordination with local gov 9b) state policy and expectations 9c) local government	Outline of project and general discussion of regional planning and council approaches Expectation that regional council will provide direction – "Clarence has worked hard to develop the mapping the vulnerable coastal areas" ? Council - "focused on the at risk areas, did not extrapolate the data around, where to stop working the polygons and does not know how the commission will interpret the targeted mapping – in that it leaves areas out. Dan states that "as a planner it is not up to him to extrapolate out the mapping" – does not have the experience or qualifications to do this - Rely on other peoples rules to apply, the scientist who developed the work should do this. (14.29)"important thing is that our provisions put into force do not preclude any development anywhere, what it does do is highlight that in certain areas you need to prepare certain documentation, which may include a report which justifies your particular proposal, we were very conscious not to introduce any new no go areas. Politically this is very difficult as soon as you put a black mark on a site and also it enables us to make an assessment on the information provided to us rather than assuming that the information we have got is gospel and won't change, a little bit of onus is being put back on the applicant or developer to prove what they want to do" "The individual has a responsibility under the scheme to demonstrate that their development is a low risk" The scheme has the 3 overlays relating to this including sea level rise & storm surge, coastal management and inundation Originally based on the sharples 2006 work "New information has basically changed the polygons but also enable Clarence to revisit the provisions..effectively beef up the inundation controls as we know more than before, essentially have come up with a set of tables which say that if you live in this area then your floor areas must be above this height, if so this would be a permitted use, if the floor levels do not meet the minimum heights then additional documentation is required to justify why this is not a problem" [applicant to provide a solution and council to review]. We also look at other overlays – included other coastal hazards such as wave run up to – coastal hazard and erosion overlay say that if you are in an areas subject to these provisions you will need to provide a report outlining how concerns in this area are dealt with such as sitting , construction techniques and how your property will affect the adjoining properties – Given the amendment is currently on Draft form no applications have been submitted under this yet. 92 bay view – application on hold at the applicants request, council had written a report which was negative on technical reasons, and they decided to prepare further information before it is formally considered. Report had been prepared for submission to council, wanted to have a lower floor level than allowed by the modelling even through it is subject to inundation and storm surge it was up to them to provide a report that it was suitable – it was difficult see that solution would work "One of the arguments was that the house had a finite life and that if it fell over in 50 yrs then so be it, that's not a responsible council position as it is unlikely that they will be their in 50yrs", and the future buyers of the property make it councils problem for if council needs to defend the properties State agencies and authorities -refer some to mast – below high water mark - marinas -refer things to dipiwe gen don't use state gov to help with climate change don't know of a particular division which knows more about our area than the council does -commission has a strong influence on the scheme's development and controls -no applications on climate change have gone to the tribunal -(25.35)"Ideally the state government should have done the mapping for us" -this would bring consistency and allow fewer holes around the state, more likely that if one project team would be a better use of resources ", At some point council's need to be conformable that they have done every thing they can reasonably do to protect it's communities.It was Clarence's view that this work needed to be completed" -the mechanism used needs to be discussed all councils must have some regard to this -schedules and overlays would be included in the council issues(not sure what this means?) Clarence scheme has a lot of merit through mapping and associated overlays controls Clarence had to define scenarios and risk flor sea level rise – ideally this should be a state action for consistency -looked at a the current day hazard lines and then looked at a 2050 and 2100 hazard lines with sea level rise -comfortable with this model, this experience shows that the distance inland varies along the coast as geology, fetch, dunes, vegetation and other factors influence the hazard under different scenarios -showing that a simple method of anything below 3m is not adequate Is the council likely to commission further works

			-also may include identifying areas where we consider planned retreat, at this stage this has not been addressed, but council is aware of these issues, over the coming years they will be pressured by the community and state to work out how they will they address these issues -raised an example of the neck in Lauderdale, this is vulnerable and if it is cut off what does council do to service these areas? Does it raise the road, build a bridge, put in a punt or let it go? -these response will require funding and this would need to be modelled for example Council pays for it with special levies, head works charge or entire rate base pays of it or, State/ commonwealth shares funding This needs to be worked out as the council does not have a position on this yet, politicly this quite awkward Are the current roles and responsibilities effective? -Have tested through assessment -Overlays can be improved but largely they serve their functions -have stoped further development in some areas (require further data from the applicant) through a minimum standard -sea level/storm surge has not worked as well as they would like as it not clear cut at this point – no definitive answer, new controls should tighten this up – difficult to assess, not sure if they can refuse based on information supplied, this has not been tested. Scheme was approved in April 2008 and has more planning scheme amendments than any other scheme bar one since its approval. State gov support for project: -fair bit support for project though funding and in kind support -most funding came from commonwealth and council -dans involvement through amendments, which has been supported by Coucnil -have shown commission the amendment through councils -concepetly very supportive -Does the commission have anything to test the amendment against "Erosion issue is typically not as recognised by community as it should be, lot of informal work currently happening in Clarence, thus additional influence on cost through people building reacting walls ect...the council currently regulates all development, and many works are permitted as long as they don't compromise anything in a overlay....broadly they are covered, but will they be actively regulating them is another question for example if works do not exceed anything you would normally have in a garden then council is unlikely to worry about that..anything beyond this that requires fill ect... may be an issue.....Currently retaining wall up to 2.1m are exempt under the scheme" -"at the moment council has not seen people actively doing this sort of work...historically council is more often than not reactive and more likely to address an issue when they see something which should not have happened in the first place and attempt to regulate it then". State responsible for identification hazards (erosion and inundation) -coordinated with local council, they no the area State should provide - Guidance on the standards and policy (personal view) Council responsible for Planning control? -no different to other controls
Evidence	Core Question What evidence is available and used by you to: Identify the hazards from CE/CI, Assess the risk posed by the development / use subject to a DA Understand and assess the consequences of future hazard/risk for CE/CI Sub Question Is the available evidence adequate to confidently underpin a recommendation to the planning authority? What are the top 3 data sources you use and how? for example Sharples *et.al.* (2008).	*Overlays in scheme* *Will the overlays be made available to the LIST for a more interactive experience* *Will the inundation and erosion maps in CCC2009 replace the sharples 2004 work currently used?* *How will hazard risk be assessed outside of the current mapped extents?* 11a) reports - evidence – examples 5mile beach Overlays 11c) assess the vulnerable and commitment and for of a ground op Funding through frontage/ head works charges Model need to be confirm hazard mitigation Council rates State and federal level	*Evidence available:* *Information – reports and modelling* *Some examples around Clarence of consequences(evidence) erosion and inundation – 5 mile beach with tree routes being exposed* *When making assessment the overlay flags the areas which require further assessment* *"Current scheme does not provide a lot of guidance, it has been difficult for council to identify the right person to assess information given to it for example should it be a planning officer, an engineer or farmed out to a consultants"* *To be fair the current application assessment has been a little adhoc* *Generally Garden sheds have been approved at officer level* *If has been a house then they the assessment has been a bit confused* *Council does not have an established role to assess this type of work, "council does not have a coastal engineer working for them able to assess this type of work, and to my (--) knowledge no other council has this either". Is the typical council engineer qualified to assess the reports...possibly not but they are the best person available to do this.* *"New scheme amendments will hopefully provide more guidance to the public, so that they can meeting the acceptable solution... with ones which don't met this council may have to forward on to other parties for assessment." .* *"Either through people who authored the report or through an informal arrangement with UTAS and get some of the engineers there to assess this work"* *This will have to be worked out over the coming months* *Evidence to assess the risk* *Assess vulnerability* *Work out council position, which they have not done yet* *Beyond this work out funding of this ie frontage scheme or headwork's* *Joint funding arrangement s is a model council would need to look at for actions such as bridge construction, dune replenishment* *This partnership arrangement between beneficiaries of the work, council and state.*

		14) Rely on overlays (draft amendment) – informal Current overlays - sharples 2006 LiDAR	*Or various state and federal funding arrangements - once this starts demand around country would be in great demand* *Top 3 data sources* *Current overlays (formal)* *Draft amendment (informal until approval) this should not be a problem as they have been based on suitable science.(2050, 2100)* *Sharples original work – is used in all of the other areas, which have not been assessed in greater depth.* *Usually ask for a report to be submitted* *LiDAR data -does not think a increment of 0.1m is relevant as if you are arguing over such a small increment then the whole area will be problematic Not sure what this means – 0.1m contours were extremely useful in generating the map!*
Risk Management	Core Question In the context of CE/CI what information / guidance is available to you to either: Make recommendations/ impose conditions to reduce risks associated with a use/development to within acceptable levels, Assess the adequacies of treatment measures proposed by developers, Generally assess the competency of expert advisors,	*CCC 2009 identifies 3 levels of coastal risk including* *Priority areas currently at risk* *Areas with a medium risk (25-75)* *Areas with a longer term risk (>75yrs)* *Additionally it provides for acceptable solutions under each of the overlays* 16a) comments that the current scheme People choose to live there Section 7.4.6 – this section has been removed by doing this it shows that if it is assessed by council, then councils is suggesting that it will be safe 16b) uncertain it is dependent on scale of approval, for example a minimal approval (fence or shed) then the planner makes a recommendation. If it is a significant development then review by engineers or consultants (author of report) 16c)look for experience - coastal engineer or hydro experience	*Risk management:* *Answered above though scheme and amendments* *Current scheme:* *-"section 7.4.6 (state this) expressed through a part 5 agreement, tribunal has challenged this section and dismissed it, shows that council does have an obligation that the councils assessment must be suitable for the continued use of the development [sunset clauses on the developments are not allowed] , commission approved it and tribunal rejected it –thus it was rejected"* *" if council does give an approval we are saying that it is going to safe"(55.55)* *-provides council with more requirement to get it right in the first place* *How do you asses the treatment of the development – a little uncertain* *-small assessments at officer level* *-more significant assessments by engineers* *-substantial development to authors of the report , or some other body such as UTAS/recognised consultants* *Assess competencies of advisors* *Require "suitably qualified person" hard to say* *Amendment asks for a engineer with suitable experience in coastal / hydrological process* *If council gets a report from a person with this they should accept it, if they don't they will have to get someone else with that experience to assess it, as the planner does not have the experience/ knowledge to judge that.* *Appropriate for an applicant to be able to got to anyone with the appropriate qualifications / experience – could be a division in DPIPWEE*
Process (use development assessment example)	Core Question How is evidence and risk guidance considered in your DA process, using a recent DA as an example.	No recent DAs which considered this available after a review of the recent council mins - In your opinion has the extra information which has been made available through the planning scheme and overlays helped the public understand the risk and hazards better? DA for 92 bay view road Applicant has put appeal on hold -council prepared the risk assessment/ proof -wanted a lower floor level which would have been subject to storm surge and erosion – needed to demonstrate it was acceptable.	Covered above: Application process and requests for additional evidence Scheme requires mandatory information, until they are fulfilled, it is deemed to be incomplete, and will sit on shelf until it is complete. Once it is complete it is assessed based on the scheme provisions within the 42 day limit If still uncomfortable then either refer to external review or informally speak to applicant to outline issues and ask if they would like to provide additional information. The applicant can either supply additional information (or not) and council will assess based on this. Thus it goes to council - if refused can the applicant may have the decision reviewed by RMPAT
Summary	Core Question How successful are the methods you outlined previously in mitigating the impacts CI/CE Could you outline any additional tools or support you could use to the management of coastal inundation and erosion through LUP What are the top 3 issues facing your council in mitigating the impacts of CE/CI, and how would you like to see them resolved. Is there anyone else you would recommend that i talk to about this? Do you have any questions of me? What haven't i asked but should have?	How successful have the methods put into the scheme been? Do you think this work could be adapted into a methodology to assess risk, policy and management priorities for councils? What where some of the barriers in undertaking this work Do you think that other councils would experience the same issues 20) Legislative support of councils Regional mapping 21) appropriate planning scheme amendments	Summaries: How successful are the methods outlined at mitigation the impacts At the moment – no significant events have taken place, standards are based in 1 in 100 yr events, -inundation last year supported the modelling -floor levels identified in scheme have matched the level flooding seen Other tools to support the scheme -broader political tools about retreat and defence, part of broader picture thus council needs to form a opinion about how to deal with an event and then adopt a planning scheme to reflect this: Highlights that council has not formed an opinion about long term actions such as defence retreat ect... For example, could use a no go blanket suitable for the design life of the development garden shed 20yrs house 50-80yrs ensure that the design is suitable for the life of the development "council has to form this opinion and it would be inappropriate for the state government to specify what the council must do for the protection or planned retreat of communities which may be beyond to the resources of the council"

		assess the likely hood of risk protective / mitigate policy state government responsible for: ID of hazards State policy on the hazard and acceptable levels of risk Planning directive force councils to amend scheme to government way 22) Clive Atwater - CEC climate futures	"may be appropriate under the local gov act to say that councils must provide a opinion on the following and provide plans which show where they will defend and retreat, but not say what they should or should not do" "ensuring the council is transparent to the community for example when a rate payer comes in to the council and says what are you going to do to protect my house, council can say we have formed the view that we will protect your house for the next 20 yrs then , next 20yrs you will pay a headworks or you are on your own" at this stage this is not required and it is unknown about when council would form this opinion – this will be a very controversial opinion top 3 issues assess likely hood of risk to community – mapping and report appropriate panning scheme amendment – time will tell if this right mitigation/ retreat policy resolution -state gov to identify all hazards and risks -state gov to develop a policy which says how the planning scheme should respond -potentially a planning directive from commission forcing councils to amend their scheme in a particular way, need to generate maps Recommendations to talk to Clive Atwater – climate futures, no obligation from council No questions back at me "Problem with regional planning is that is enabled through cooperation through councils, councils can opt out thus may not be as harsh as it could be." Recorder runs out of battery Summaries stuff

Kingborough Interview Questions and responses

Question broad topic	Question	Summary by annotated transcript and notes	Annotated transcript & Quotes
Set up	Name and role What are you responsible for? i.e. what decisions do you make and what do you refer to other roles Could you outline your career, training and mentors?		Roles and responsibility Very little information to clarify roles – unclear about responsibility, Warren Jones (GM Environment – DPIWE) a v good place for support/ start- provides support and cooperation in assisting the assessment of major erosion/inundation questions, most developments not a problem "...Rule of thumb 1km of coast or a floor level less than 3m above the high water mark as measurable triggers..." Two key dimensions arbitrary dimensions to trigger further study/ closer study Additional evidence for a closer look, recognise a specialist study Difficulty for flood planning on river flats, with historical photos, changes in rivers and land use – no overlay rainfall and built environmental – assessments of flood are difficult and expensive – 3m above water level, if clearly in a flood plain then evidence is required to see that it is above the 1 in 100yrs flood level. Relation to foreshore go to sharples, it has no formal basis – far from ideal and best we have, gives you an idea of shore condition. Other study on converting sharples to a meaningful test for council property based assessment – Phillip Leaver (DIPWE) Tells you coast type not hazard or risk – attempted to convert to a format for usefulness for council Risk based on building type and potential risk – intensive approach Decisions they make they have a defend even as a class action – thus the risk assessment was not taken onboard as it had no legal validity Unwilling to taking on a responsibility of implementing, with no control over it as it is subjective Would council commission a hazard/risk map however believe that it a state/ federal reasonsibility as it universally applicable - could be regional responsibility. Thrust needs to centre on standardising the response to climate Something need to triggers personal responsibility State responsible for standard hazard identification and risk, conditions around it - establishing a set of guidelines about how to interpret a the guidelines – better not to have the info than to have quantified the hazard and not do anything around it Sharples highlights where their may be an issue and when you can safely ignore the problem, otherwise you would require every development to provide a coastal hazard assessment – can use a recognised assessment to say it is safe or risk based (which would be a unfair impost) Within coloured area then it worth further assessment Accuracy for mapping - "ideal would be able to identify genuine risk under a range of scenarios.." 0.5, 1, 1.5 and a time frame Spatial to cadastral parcel – so that it triggers a assessment The sub cadastre level of assessment only recorded on the DA not at any other location Adjacent props assessed by accredited person, expectation that they would chase up adjacent studies - view that a suitably qualified person who's experience is accepted in the industry then the outcome is not questioned Things are sometimes referred back if there is a question over validity Top 3 data source sharples, council gis(the list) and individual studies Is the available evidence adequate – not relevant, as if the area triggers (nothing better exists and the state is responsible for identification of hazard as the sea level rise does not recognise sea level boundaries) a study then it becomes the individuals responsibility to provide evidence and mitigation of hazard and risk No reason to account for individual (community needs) in ce/ci as it affects every one equally Risk management, covered above Assess adequacies of treatments Based on local experience in the council, unless it is highly technical then a 3rd party peer review would occur Competency as above - small number of people able to do it, gen the same people - new person would be asked to demonstrate the standing as an expert Hazards addressed at the time of Sub division No further coastal subdivision happing – unless in a built up area, either exposed or not to flooding if so be required to prepare a study (not considering erosion risk) [where is this information recorded] Sites a Margate example –council refused on flooding grounds applicant was able to demonstrate to the tribunal that they are not exposed to flooding as it meet the technical requirement of planning scheme (does this mean that the planning scheme is inadequate) Risk for council is distanced from the decision however Council may have to provide defences to the subdivision Tribunal could argue that the area should have been rezoned to flood prone (does this exist in KCC scheme?) Summary How successful are the current methods - reasonable successful as they prevent further subdivision – for building works then application has to design mitigation methods to bring into compliance Other tools (planning schemes stops it in new areas) to use – not really – as further development largely prohibited. Coastal settlements, LUP tools and - likely to use the policy phased retreat, okay while you are still there but if it falls down then its over – no alterations extensions development, treated as non conforming uses and not encouraged to occur. May consider some defence - depending on policy direction from gov Question on where council will defend to such as infrastructure
Roles and responsibilities Based on the matrix of roles and reasonability	Core question For natural hazards generally, what information is available to assist in clarifyng the roles and responsibilities of: State agencies and authorities, Regional authorities, Planning authorities, Individuals or non-government organisations Probe questions What information do you need in this area? Has the council commissioned work to understand the hazard/ risk which CE/CI present? Is the council likely to commission work in the future? Are the current roles and responsibilities effective in mitigating the impacts of natural hazards? If not how would you change them? Core Question In terms of CE/CI, who is/should be responsible (multiple ok) for Identifying hazard/risk Providing guidance/standards for risk management for CE/CI Planning control	Very little information to clarify roles of the different level of gov – David is unclear about who is responsible for what DPIWE – environment group is used as a starting point with Warren Jones [GM environment division of DPIWE] being extremely co operative in environmental and coastal issues Council requires guidance what to do Currently use the two rules of thumb to trigger further assessment Within 500m of coast [as defined in the scheme] Floor height of 3m above high water mark Trigger highlights that a closer look is required and that a expert opinion is required for risk and mitigation Council may commission work if a stronger need becomes apparent but likely to be localised study ie Kingston Beach Any mapped areas should be to the parcel level, the individual to do the sub parcel analysis [this is only recorded on the DA with the file it is expected (but not checked?) that DAs considering the same problem should have considered the response on the adjacent property Mapping should be for a range of scenarios Response needs to be standardised across the island State / Federal government should be responsible for identification of hazard extents and provide guidance on the interpretation of risk and regulation of them. Local government should be responsible for the statutory and local planning policy	
Evidence	Core Question What evidence is available and used by you to: Identify the hazards from CE/CI, Assess the risk posed by the development / use subject to a DA Understand and assess the consequences of future hazard/risk for CE/CI Sub Question Is the available evidence adequate to confidently underpin a recommendation to the planning authority? What are the top 3 data sources you use and how? for example Sharples *et.al.* (2008).	No real evidence or tools currently in place other than the triggers and no new subdivision will be taking place in the coastal zone - as this area is largely covered by the environmental zone and schedule 5 of the scheme Established settlements such as Kingston beach have a problem, but the size of the problem is unknown and unlikely to be studied until risk is greater Planning scheme requires the individual if they are within the rules of thumb to consider the hazards and risk to life because no real other information is available Sea level rise and the associated hazards are a state issue as they recognise no boundaries thus the identification and mitigation of the impacts should be addressed at the state level with guidance given to local government for implementation through the planning scheme Top 3 data sets include Sharples – not formally used under the scheme however used to highlight where problems may occur, and where they can ignore Council GIS/ The List	

		Development specific studies	Identifies Kingston beach as the most risky location -- also most likely to be developed as high development – phased retreat no likely – protection likely while Conningham would not be defended as the total risk is less
Risk Management	Core Question In the context of CE/CI what information / guidance is available to you to either: Make recommendations/ impose conditions to reduce risks associated with a use/development to within acceptable levels, Assess the adequacies of treatment measures proposed by developers, Generally assess the competency of expert advisors,	Very little information is available and what is available is confusing Sharples is used as a guide (from the LIST or council GIS) For tricky DAs an outside opinion may be sought (environment DPIPWE) - no hard and fast rules just what the planer feels they need to justify to the council/ commission Assessment of treatments is based on local experience in the council, unless it is highly technical then a 3rd party peer review would occur Competency as above - small number of people able to do it, gen the same people – new person would be asked to demonstrate the standing as an expert	How is the council going to look at what to with risks and consequences – no strategy for this – need some policy direction to base decisions and reference work Need base work to confirm the detailed risk assessment – danger needs to be higher so that Other questions View that it is critical for council but needs strong policy frame work to lead it. Pressure needs to come from state gov Community not ready to hear the risk level Change risk language to real hazards – scientists unable to state a definitive risk level flooding, erosion ect... "the problem with the prevailing theory is that they (the tribunal) want hard evidence and it does not exisit"- "someone at some stage needs to determine that this might be arbitrary but this is the deal and this is why we fall back on 3m and 500m as because property and development opportunity is money in the bank and people need to know before they buy, how do they know, i'm sorry sir you will need to do al risk assessment on the property, before they buy it.. and that is an unfair impost ..and it is incredibly inefficient and expensive...governments are reluctant to do this as they may get hit by compensation claims" Opportunity cost versus recent purchase, beach blocks are expensive and they will want to capitalise on it. Logic is that CC is human based so that we can do something about it Interested to know what other councils are thinking Problem in RPDC they want certainty (*47min*) Questions around if an area is zoned residential then you should be able to put a house on it - thus if it residential and has environmental or hazard problems – should it be residential in the first place? Back zoning issue with an idea of compensation what is the consequence as different zonings have different land values associated to them Wished luck as powerful interests will be against it Issue with some coastal props is that they have gone from occasional use to fulltime occupation for a family.
Process (use development assessment example)	Core Question How is evidence and risk guidance considered in your DA process, using a recent DA as an example	Evidence and risk should be considered when the subdivision occurs DA showing what the council felt was a flood prone area – thus the council turned it down, on appeal, the tribunal approved the application This occurred because council did not have a flood study saying the area was flood prone and consequently did not have in the scheme an overlay saying such. No further coastal subdivisions will be occurring, existing properties which are vulnerable have not been addressed at this point	
Summary	Core Question How successful are the methods you outlined previously in mitigating the impacts CE/CE Could you outline any additional tools or support you could use to the management of coastal inundation and erosion through LUP What are the top 3 issues facing your council in mitigating the impacts of CE/CI, and how would you like to see them resolved. Is there anyone else you would recommend that i talk to about this? Do you have any questions of me? What haven't i asked but should have?	Reasonably successful as the individual is responsible for identification of the hazard /risk and is required to design mitigation methods Currently no additional tools are needed as the owner is responsible Need for a coastal hazards policy framework current draft coastal policy is impossible to implement without significant work and guidance. Need a number and a set of scenarios for different levels of hazard / risk with an area attached - this should be defined by government who are more removed from property developers Two examples of potential issues with no answer without gov direction Coastal shack the individual must apply to council to defend property from erosion/ sea level rise. Kingston beach – should be defend as peoples lives are potential at risk No strategy for LUP tools as a lack of policy direction exist with potential tools including Defence of land Planned retreat (no defence allowed) No extensions in at risk areas Dwellings allowed to retreat if their land allows it Back zoning – is compensation required Different types of settlements / locations will have different types of mechanisms - for example Kingston beach could be defended while a coastal shacks would have a retreat mechanism Questions of equity around some coastal communities which have converted from temporary living to permanent occupation - they no longer meet the original purpose, the council did not convert them from lease to freehold and are responsible for the implementation of policy on this - does state gov have a responsibility to compensate for back zoning of these areas or giving policy direction on this?	

Waratah Wynyard council - Interview Questions and responses –

Question broad topic	Question	Transcript and notes by question	Annotated transcript & Quotes
Set up	Name and role What are you responsible for? i.e what decisions do you make and what do you refer to other roles Could you outline your career, training and mentors?		Project review Looking at current practice around CE/CI hazards, risks ect... Draft coastal policy – Ir expresses an opinion about it as a starting point and may need more to be implemented, does not have enough information to make it work, - - suggests that it is not specific enough to be to assist council implemented States that there is a need for a workable coastal policy Council will stick to planning scheme and standards within it to protect the coastal zone Suggests that it would be unworkable to implement coastal policy as it defines the coastal zone as land up to 2km inland. Sites the Qld example of a AHD of 10m (less than) as the coastal zone to highlight that this would be more workable. Climate change issue need to be clarified for local government and needs to be implemented through the regional planning initiatives, – in line with the state polices Current application if they meet the planning scheme will be approved – this does not get to the depth of the issue they are trying get to in relation to climate change Expressed that the affects of CC such as coastal inundation/ erosion is not clearly understood and will need further work. Chris sharples work shows that a lot of the potential inundation, will occur in some towns – highlights ..." ... council does not have a clear position of what to do about this, and that council would wait until the regional planning initiative is complete before they begin to formulate a position on this." Most of Wynyard is largely 5 6m AHD and inundation is all along the coast. From this they are looking for some legislative tools to assist in adaption to the issues Current tool (6m from environmental zone) example of boat harbour with landslip on one side and coastal inundation on the other Highlights the importance of ".. the regional planning project to correct the short comings in the current planning schemes" "Current scheme only focus on the dune setbacks" not on the back flow issue rising from creek flow merging with coastal inundation Existing environmental management zone follows the coastal line around with controls to say development must be 30m off waterways and set back by 6m from the zone on the coast Large number of settlements which break this regulation, (– -) such as Sisters Beach has a re-entrant bay with a creek on one side and sea on the other side under climate change where is the water going to go – erode the frontal dune and get inundation their – scheme does not address this Amendments on the current scheme will role through regional planning project - regional scheme is reasonably close to coming out with what should be included in the local scheme The model scheme should include the following: Define the limits to the natural hazards All issues with hazards should become formed schedules under the planning scheme PW does not know the answer to the question of if the model scheme will identify the areas at risk or impact areas, but would like it to – answer is unknown. Problem for local government to identify themselves is series projects over the coastal areas with limiting factors including: Financial limitations Number of "expert" people able to do the work is limited – not enough resources " Thus should be done on a regional basis otherwise will end up with a hap hazard implementation" – raises the landslip work completed by MRT including mapping and implementation methods – gives consistency, provided interpretation – would like to see the land slide/mrt styled tools for climate changes Example of the CAM river –studies should be done on the regional basis as they are regional problems and consequences What information do you currently use to assess this? Sharples2004 – only used as a guidance No direct tools under the scheme to consider inundation or erosion however the following schedules relate to it waterways and wetlands schedule sighting and development schedule "If nothing is trigged under the scheme then the DA will get a permit" – no further study will be done, if it does not meet the criteria then the performance criteria will be implemented and the applicant would demonstrate against this How are the treatments 'mitigations assessed? Council reviews against criteria, if unsure then a review by their consultant GHD will occur (LR)What else would they like in this space " reference manual stating what they should be looking for such as for the landslip areas with a range of acceptable treatments and mitigations ..." this would help to define what acceptable solutions are implementation What information / evidence do you currently use when assessing applications with coastal issues "Currently rely on local knowledge and back ground knowledge of staff", regularly use Chris Sharples work – find the work good Additional things include a " definitive answer for the impact level for a range time dates and tide levels .. " LG is crying out for a definitive policy statement – state decision " Landslip analysis sets the precedence for the state to take leadership in the mapping, analysis and interpretation and policy work for natural hazards" – coastal hazards should be undertaken in the same way "The draft coastal policy has many studies which need to be completed before it can be implemented" this should be completed on a regional basis (at the smallest level) - in addition to this polices should not be released without a guide to the implementation including where the additional knowledge/ information will come from
Roles and responsibilities Based on the matrix of roles and reasonability	Core question For natural hazards generally, what information is available to assist in clarifying the roles and responsibilities of State agencies and authorities, Regional authorities, Planning authorities, Individuals or non-government organisations Probe questions What information do you need in this area? Has the council commissioned work to understand the hazard/ risk which CE/CI present? Is the council likely to commission work in the future? Are the current roles and responsibilities effective in mitigating the impacts of natural hazards? If not how would you change them? Core Question In terms of CE/CI who is/should be responsible (multiple ok) for: Identifying hazard/risk, Providing guidance/standards for risk management for CE/CI, Planning control	State responsibility Need state guidance for the acceptance, identification, adaption and mitigation methods - these need to be adopted to local conditions Define the hazard scenarios Current risk 2050, 2100 Regional Bodies Needs to a least do the analysis and mapping of CE/CI risk and hazards Provide the model planning overlays and conditions Local Council To implement the regional planning project scheme Regulatory body Current draft state coastal policy gives no guidance for implementation and is unworkable for councils as it requires a large number of studies defines the coastal zone as land up to 2km inland The council is unlikely to commission work unless the risk becomes immediate Currently the planning scheme provides the following tools. High water mark Set back from coastal zone (6m) Waterways schedule – sitting and required setbacks	
Evidence	Core Question What evidence is available and used by you to: Identify the hazards from CE/CI. Assess the risk posed by the development / use subject to a DA Understand and assess the consequences of future hazard/risk for CE/CI Sub Question Is the available evidence adequate to confidently underpin a recommendation to the planning authority? What are the top 3 data sources you use and how? for example Sharples *et.al.* (2008).	Use sharples (2004) for appeals as it identifies areas which are potentially affected by inundation Controls in schedule for setbacks Local knowledge Use GHD for planning support if the council feels they do not have the experience or expertise to assess a DA A manual or set of guidelines, in a similar way to bushfire or landslip would assist in State needs to take Policy lead in climate change Min heights and set backs Top data sources include Sharples 2004) LiDAR Airphoto They would like mapping of hazards and risk of a suitable scale to base decisions on	

Risk Management	Core Question In the context of CE/CI what information / guidance is available to you to either Make recommendations/ impose conditions to reduce risks associated with a use/development to within acceptable levels. Assess the adequacies of treatment measures proposed by developers, Generally assess the competency of expert advisors,	Regional planning project will provide guidance on this Need legislative tools Can use a 6m set back for the coastal zone – cumulative issue	LiDAR data been fantastic and actively used on GIS, get regular air photos flow, not sure of scale and fitted with the GIS - very useful tool, raises the previous program with PFT and digital globe imagery – good program, but councils did not have the tools to use it – data needs to be used at the coal face [upgrade your computer networks] ended up of little value Use MapInfo GIS –useful tools Limited existing mapping , engineering may have them – sitting schedule highlights spring tides, flooding and inundation and the need to be clear of them – Jane highlights that a flood overlay exists for the Flowerdale. Performance criteria allows for hydrology studies "Given climate change i am not sure how much more land we can develop..." limiting factors include Sea level rise and erosion on the coast Land slips in the hills Prime ag land on the river flats and plateaus Rampant urb in growth Developers may start to look at engineering solutions Scheme has the latitude in it to develop land which has not been developed to date for good reason, however if the scheme included specifications that would stop development below a certain AHD then a lot of inappropriate developments would be stopped which are not currently – this is a weakness in performance based schemes ' Councils (not necessarily staff), are political creatures and susceptible to development pressure, can end up with inappropriate development which may or may not come back to bite people on the butt in years to come ' sometimes a pressure to approve If it looked like a development would come back and be an issue what would the council do? Council would take a position which will protect them, in terms of inundation I m sure council ' suppose one of the councils will be tested against the shades of gray with council saying no the – the developer will take it to appeal and not sure how the current performance schemes will stack up – esp given the tribunal deals on matters of administration The point is the only time you can exercise discretion is if they don't meet the acceptable solution and then you rely on the performance criteria if they meet the acceptable solution they are permitted and are bound to get a permit That why it is fairly crucial that the regional planning initiative will address the issues we have been talking about What are the major issues the council has got in regards to the impact has the council identified it Big risks used to be Sewerage treatment plants and pumps – moved to authorities All infrastructure which the council is the owners including surf clubs, walkways and stormwater If replacing infrastructure what sort of tools would you like to assist in moving to a less risky area would depend on 2 main drivers Where the at risk areas are and conversely where it would be safe in terms of AHD The second driver is cost. "Most coastal towns are at the bottom of the catchment for example, most sewers are gravity feed, it costs a lot to pump sewage uphill especially given the location of towns" Same problem for other infrastructure – not as serious Big question for council on risk is do they protect or do they retreat? "Residents are able to apply to developments such as defensive work under the current scheme In terms of the residential areas that are at risk – example of dodges ferry with the use of stone walls and fill to protect the residential developments PK unsure what sort of policy, council will adopt without a greater understanding of the hazard and risk. "Should public money should be used to protect private assets?" Would council stop it if a local community decided to group together and defend a area with their own money not councils? "It would depend on the proposal – but not sure which way council would go, these are the questions council will be forced to answer in the future" When council is forced to make this decision it will look at how the question has been addressed around the country the insurance side of it When they get to this decision what guidance would you want? Geomorph advise on the consequences of remediation or no action would be How far would the coast retreat or what will the impact be up the coast' to the sediment budget May be cheaper to buy the props and let the coast regress, but should public money be used for this? What would you like to see? – "....you shouldn't necessarily put in protection works and you shouldn t use public money to prop up private property, can't hold back the sea .." (private opinion) A lot pressure would be on council to protect not only its assets but also private assets or enable the defence of the properties though research and mitigation methods "Council is unlikely to prepare the advise on risk, hazard and mitigation of its own accord until the risk becomes immediate' - without state government direction and strong policy work – a model planning scheme needs to be developed to facilitate this (42min) Scheme is 2000, (first or second performance based scheme) came in before the model template – good scheme with fair scope but it does not address the bigger issues disappointed by the coastal policy as it doesn't give any implementation advice, the regional planning scheme will be used to update the existing planning scheme Who is running the nw project – Patrick Earle Huge project with natural hazards becoming more of an issue Very interested in where they go with the inundation policies – with the major urban areas sitting on rivers – huge costs "The smaller councils would get to a policy position if they had some data to hang off, the council is not able to spend a lot of money preparing the base information themselves, the state should prepare the base information, the council just can't afford it given small rate bases, thus policy making becomes more reactive and just in time" Anything also i should have asked Where to form here – collating results and writing up the report One of the major affects in the catchments as the water needs to get out of the rivers and if sea level rises then the river levels will increase No know assessment of existing min floor heights Protection of small coastal settlements – would require state support including building of dams and storm water systems to stop inundation
Process (use development assessment example)	Core Question How is evidence and risk guidance considered in your DA process, using a recent DA as an example		
Summary	Core Question How successful are the methods you outlined previously in mitigating the impacts CI/CE Could you outline any additional tools or support you could use to the management of coastal inundation and erosion through LUP What are the top 3 issues facing your council in mitigating the impacts of CE/CI, and how would you like to see them resolved Is there anyone else you would recommend that i talk to about this? Do you have any questions of me? What haven't i asked but should have?	Regional planning scheme Define sea level rise (hazard/ risk) Setbacks How to ID the hazards The top 3 issues for council are Risk identification through an overlay for hazards and vulnerable areas Limited financial and experts resources to do this – thus more efficient to do this on a regional basis Use a similar process and tools as supplied in the landslip mapping and advice Look for consistency across the region Future tools and needs. Council needs to protect them self from litigation Regional planning initiative to advise on tools Questions yet to be addressed by councils Protect elements at risk or have planned retreat Not sure if the local community could do the defence work currently any mitigation/ defence works would be assessed under the current DA process Council will be forced to make a decision – good information is needed on the geomorphic consequences of remedial actions Council has a wait and see approach Recommend that i talk to the regional planner – Patrick Earle	